SECTION 12

REGULATED POLLUTANTS

This section describes the selection of pollutants being regulated by the revised effluent limitations guidelines and standards for current Subpart A (cokemaking) and Subpart B (sintering), and the newly promulgated effluent limitations guidelines and standards for new Subpart M (other operations). Regulated pollutants are pollutants for which EPA establishes numerical effluent limitations and standards. EPA selected pollutants for regulation based on the following factors: applicable Clean Water Act provisions regarding the pollutants subject to each statutory level; the pollutants of concern (POCs) identified for each subcategory and segment; and cotreatment of compatible wastewater from different manufacturing operations. This section describes the methodology and rationale EPA used to select the subset of regulated pollutant parameters from the list of pollutants of concern.

12.1 Regulated Pollutant Selection Methodology for Direct Dischargers

The list of POCs for each subcategory represents those pollutants that are present at treatable concentrations in a significant percentage of untreated wastewater samples from that subcategory; the selection of POCs for each subcategory is presented in Section 7 of this document. Effluent monitoring for all POCs is not necessary to ensure that iron and steel wastewater pollution is adequately controlled, since many of the pollutants originate from similar sources, have similar treatabilities, are removed by similar mechanisms, and are treated to similar concentrations. Therefore, it may be sufficient to monitor for one pollutant as a surrogate or indicator of several others.

From the POC list for each regulated subcategory, EPA selected a subset of pollutants for establishing numerical effluent limitations. EPA considered the following factors in selecting regulated pollutants from the list of POCs for each subcategory:

- The pollutant was detected in the untreated wastewater at the BAT facility/facilities at treatable levels in a significant number of samples. This was the same methodology applied in calculating long-term averages (LTAs) and is discussed in Section 14.

- The pollutant is not used as a treatment chemical in the selected treatment technology option. EPA excluded all pollutants that may serve as treatment chemicals: aluminum, boron, fluoride, iron, magnesium, manganese, and sulfate (several other pollutants are commonly used as treatment chemicals but were already excluded as POCs). EPA eliminated these pollutants because regulation of these pollutants could interfere with their beneficial use as wastewater treatment additives.

- The pollutant is not considered a nonconventional bulk parameter. EPA excluded many nonconventional bulk parameters, such as chemical oxygen demand (COD), total Kjeldahl nitrogen (TKN), total organic carbon (TOC), nitrate/nitrite, and total petroleum hydrocarbons measured as silica gel treated hexane extractable material (SGT-HEM). In general, EPA excluded these parameters because it determined it is more appropriate to target specific compounds of interest rather than a parameter that measures a variety of pollutants for this industry. The specific pollutants that comprise the bulk parameter may or may not be of concern; if specific pollutants are of concern, they are usually considered individually.

- The pollutant is not considered to be volatile. EPA excluded almost all volatile pollutants because they are likely to be volatilized if they reach certain treatment system unit operations such as chemical precipitation or biological treatment. Volatile pollutants are not considered treated by some unit operations. For purposes of this evaluation, a pollutant was considered to be volatile if its Henry's Law Constant is greater than 10^{-4} $atm \cdot m^3/mol$. If EPA could not obtain a Henry's Law Constant for a particular pollutant, it assumed the pollutant was not volatile.

- The pollutant is effectively treated by the selected treatment technology option. EPA excluded all pollutants for which the selected treatment option was ineffective (i.e., pollutant concentrations remained the same or increased across the treatment system).

- The pollutant is not adequately controlled through the regulation of another pollutant. This consideration depends on the pollutants of concern and the technology basis for the limitations. Generally, EPA selected at least one pollutant from each pollutant group considered for regulation to ensure control of all remaining POCs in the pollutant group, For example, when one or more metals is selected for regulation for a chemical precipitation system, EPA presumes that controlling those metals will control all other metals considered for regulation.

- The model technology is designed to treat the pollutant. The Agency did not regulate POCs for which the model treatment technology was not designed or intended to treat (e.g., chemical precipitation systems are not designed to treat organic constituents, so EPA would not select organic constituents for regulation at options using only chemical precipitation). EPA did not regulate these pollutants because these technologies can not consistently achieve the effluent concentrations.

The following subsections describe EPA's pollutant selection analysis for the cokemaking, sintering, and other operations subcategory.

12.1.1 Cokemaking Subcategory

The cokemaking subcategory covers the non-recovery and by-product recovery cokemaking segments.

Non-Recovery Segment

EPA established zero discharge of pollutants for the non-recovery segment of the cokemaking subcategory (BPT, BCT, BAT, and NSPS). Therefore, it did not apply its pollutant selection methodology to this segment.

By-Product Recovery Segment

This rule establishes BAT limitations for five pollutants: ammonia as nitrogen (ammonia-N), total cyanide, phenols (4AAP), benzo(a)pyrene, and naphthalene. It establishes NSPS limitations for the same five pollutants plus TSS, pH, and oil and grease measured as hexane extractable material (O&G). These limitations and standards are based primarily on ammonia stills and biological treatment with nitrification for direct dischargers. The regulated pollutant selection criteria matrix for the 72 POCs considered for regulation for the by-product recovery segment is illustrated in Table 12-1. The following discussion explains the rationale used to select which of the 72 POCs to regulate at BAT/NSPS.

- Conventional Pollutants: EPA identified biochemical oxygen demand, O&G, and TSS as POCs. These pollutants are not subject to BAT limitations and are adequately controlled by existing BPT/BCT limitations. EPA selected O&G, TSS, and pH as regulated pollutants for new sources, however.

- Nonconventional Bulk Parameters: EPA identified and excluded the following five nonconventional bulk parameters: chemical oxygen demand (COD), total Kjeldahl nitrogen (TKN), total organic carbon (TOC), nitrate/nitrite, and SGT-HEM.

  However, EPA established final regulations for the nonconventional bulk parameter for phenols (measured as 4 amino-antipyrene (4AAP))[1] rather than the proposed regulation of the compound phenol as measured with a gas chromatograph-mass spectrometer (GC-MS). EPA decided to continue to regulate phenols (measured as 4AAP) and is not making the change as proposed. The data in the record show that there are two primary phenolic compounds present in iron and steel wastewater: phenol and 2,4-dimethylphenol. Furthermore, the data show that by controlling phenols (4AAP), both of these compounds are effectively controlled. Compliance monitoring costs are lower for the bulk parameter for phenols

[1]Throughout this document and in this rulemaking record, EPA also refers to this as total phenols or total phenolics.

(4AAP) than for the compound phenol. Furthermore, since it takes longer to obtain laboratory results for phenol (GC-MS), EPA does not want to discourage routine monitoring of phenols (4AAP) that allows a mill to identify and respond quickly to potential upset conditions.

- Volatile Pollutants: For purposes of this evaluation, a pollutant was considered to be volatile if its Henry's Law Constant is greater than 10^{-4} atm·m^3/mol. The Henry's Law Constants for the organic POCs (those analyzed using Methods 1624 and 1625) are listed in Table 12-2. If EPA could not obtain a Henry's Law Constant for a particular pollutant, it assumed the pollutant was not volatile.

  The Agency has developed National Emission Standards for Hazardous Air Pollutants under Section 112 of the Clean Air Act Amendments of 1990 that controls air emissions from cokemaking operations (58 FR 57898, October 1993). The Agency also proposed maximum achievable control technology air emission standards for pushing, quenching, and battery stacks at cokemaking plants. These regulations are currently scheduled for promulgation in December 2002. By-products recovery operations in the cokemaking subcategory remove the majority of hazardous air pollutants through processes that collect tar, heavy and light oils, ammonium sulfate and elemental sulfur. Ammonia removal by steam stripping could generate a potential air quality issue if uncontrolled; however, ammonia stripping operations at cokemaking facilities capture vapors and convert ammonia to either an inorganic salt or anhydrous ammonia, or destroy ammonia. The vapors are combined with coke oven gases and recycled back to the coke oven battery.

  EPA identified 23 volatile pollutants as POCs for this segment. There are essentially three dominant processes that affect the removal of pollutants from wastewater within the selected BAT/NSPS treatment system unit operations: air stripping, adsorption to solids or the biomass, and biodegradation. The extent to which each process contributes to the removal of pollutants from wastewater can vary significantly. It is a function of both the physical and chemical characteristics of each pollutant, as well as the conditions present in each treatment unit operation. The higher a substance's Henry's Law Constant, the more likely that compound is to migrate from water to steam in the ammonia still. Unlike many technologies considered during the development of effluent guidelines, this technology does not achieve removal of volatile pollutants by volatilization into the air. The ammonia still portion of the model technology captures and recovers the steam.

  Consequently, EPA selected one volatile pollutant, naphthalene, for regulation. EPA retained naphthalene for regulation because it is a semivolatile compound and a good indicator of removal in the ammonia recovery system as well as biological treatment effectiveness. The Henry's Law Constant for naphthalene is 4.6×10^{-4} atm·m^3/mol which is slightly higher than EPA's criteria for identifying volatile compounds -- greater than 10^{-4} atm·m^3/mol. By regulating naphthalene, EPA is confident that the other 22 volatile pollutants will be effectively removed in the treatment system.

- Treatment Chemicals: EPA identified and eliminated one POC that is also used as a treatment chemical: boron.

- Pollutants Not Detected at Treatable Levels: 10 of 18 pollutants identified as Not Detected at Treatable Levels were excluded from regulation. These pollutants are: arsenic, 2-butanone, benzidine, benzo(ghi)perylene, benzo(k)fluoranthene, beta-naphthylamine, indeno(1,2,3-cd)pyrene, o-toluidine, perylene, and 1-naphthylamine. Boron, SGT-HEM, and six volatile compounds were already eliminated.

- Pollutants Not Treated Consistently: EPA eliminated three pollutants, selenium, mercury, and thiocyanate, because none of the treatment systems EPA considered were designed to achieve consistent effluent concentrations of these pollutants. Nitrate/nitrite was already eliminated.

- Pollutants Controlled By Regulation of Others: EPA eliminated amenable and WAD cyanide because they are controlled by total cyanide. Similarly, EPA eliminated phenol and 2,4-dimethylphenol because they are controlled by phenols (4AAP).

The remaining pollutants are all non-volatile organic compounds. As explained above, EPA had already selected naphthalene, a semi-volatile pollutant, for regulation. EPA additionally selected benzo(a)pyrene as a regulated pollutant as an indicator of effective biological treatment. While naphthalene can be removed to low levels using ammonia stripping alone, consistent benzo(a)pyrene levels require effective biological treatment. EPA selected benzo(a)pyrene as an indicator of biological treatment because of its toxicity, chemical structure, physical properties, and frequency of detection in cokemaking wastewaters.

EPA then eliminated the remaining twenty organic pollutants because controlling phenols (4AAP), benzo(a)pyrene, and naphthalene will effectively control these POCs, too; the chemical structure and physical properties of the regulated pollutants cover the spectrum of non-volatile organics found in cokemaking wastewaters.

12.1.2 Sintering Subcategory

For this final rule, EPA concluded it was inappropriate to revise the pollutants currently regulated in this subcategory. However, it did establish additional limitations and standards for one new pollutant in the wet air pollution control system segment of the sintering subcategory, 2,3,7,8-tetrachlorodibenzofuran (TCDF). The limit for this pollutant is based on the addition of multi-media filtration to the technology basis for the existing BAT/NSPS limitations.

2,3,7,8-TCDF is one of a number of extremely toxic congeners of the dioxin/furan family of compounds. During EPA sampling episodes, several of these congeners were found in both the raw and treated wastewater from sinter plants operating wet air pollution control technologies. EPA decided to use 2,3,7,8-TCDF as an indicator parameter for the whole family of dioxin/furan congeners for several reasons. First, 2,3,7,8-TCDF is the most toxic of the congeners found in treated sintering wastewater. Second, 2,3,7,8-TCDF was the most prevalent of the dioxin/furan congeners in these waste waters. Finally, 2,3,7,8-TCDF is chemically similar to the other dioxin/furan congeners and its removal will similarly indicate removal of the other congeners.

12.1.3 Other Operations Subcategory

The other operations subcategory is comprised of three segments: direct-reduced ironmaking (DRI), forging, and briquetting.

Direct-Reduced Iron Segment BPT, BCT, and NSPS

For the direct-reduced iron (DRI) segment of the other operations subcategory, EPA established BPT, BCT, and NSPS for TSS and pH. The technology basis for these limitations and standards is: solids removal, clarification, high-rate recycle, and filtration of blowdown wastewater. EPA selected TSS because it is a key indicator of the performance of the technology basis. EPA regulated pH because the pH of discharge water is of concern because of its potential impact on the receiving body of water.

The Agency did not regulate any priority or nonconventional pollutants for BPT, BCT, BAT or NSPS. EPA only identified ten pollutants that passed the selection criteria for POCs. These are O&G, TSS, ammonia-N, COD, fluoride, SGT-HEM, aluminum, iron, manganese, and titanium. Of these, EPA eliminated SGT-HEM and COD because they are nonconventional bulk parameters. EPA also eliminated the three treatment chemicals (aluminum, iron, and manganese). EPA eliminated titanium because it was not found in the effluent at any DRI site (see Table 11-1). EPA eliminated fluoride because it is not effectively treated by the technology basis and ammonia-N because it was detected at relative low concentrations in untreated DRI wastewater, 13.9 mg/l. Finally, EPA eliminated O&G because it was no detected at treatable levels at the model facilities.

Forging Segment BPT, BCT, and NSPS

For the forging segment of the other operations subcategory, EPA established BPT, BCT, and NSPS for pH, O&G, and TSS. Based on an analysis of industry provided data, EPA determined that the principal pollutants from forging operations are O&G, TSS, and metals. EPA did not identify any specific priority and nonconventional POCs because EPA lacked data for these pollutants. Contact water and hydraulic system wastewater comprise most of the process wastewater from forging operations. The model technology is comprised of high-rate recycling, oil/water separation, and filtration of blowdown wastewater which effectively controls O&G and TSS for this segment. EPA regulated pH because the pH of discharge water is of concern because of its potential impact on the receiving body of water.

Briquetting Segment BPT, BCT, BAT, and NSPS

For the briquetting segment, EPA established BPT, BCT, BAT, and NSPS. These limitations and standards are: no discharge of process wastewater pollutants.

12.2 Regulated Pollutant Selection Methodology for Indirect Dischargers

Unlike direct dischargers whose wastewater will receive no further treatment once it leaves the facility, indirect dischargers send their wastewater to publicly owned treatment works (POTWs) for further treatment. However, POTWs typically install secondary biological treatment systems that are designed to control conventional pollutants (biochemical oxygen demand (BOD), TSS, O&G, pH, and fecal coliform), the principal parameters in domestic sewage. Except for nutrient control for ammonia and phosphorus, POTWs usually do not install advanced or tertiary treatment technology to control priority and nonconventional pollutants, although secondary biological treatment systems may achieve significant removals for some priority pollutants. Instead, the Clean Water Act envisions that implementation of pretreatment programs and industrial compliance with categorical pretreatment standards will adequately control toxic and nonconventional pollutants in municipal effluents.

Therefore, for indirect dischargers, before establishing national technology-based pretreatment standards, EPA examines whether the pollutants discharged by the industry “pass through” POTWs to waters of the United States or interfere with POTW operations or sludge disposal practices. Generally, to determine if pollutants pass through POTWs, EPA compares the percentage of the pollutant removed by well-operated POTWs achieving secondary treatment with the percentage of the pollutant removed by facilities meeting the BAT effluent limitations. A pollutant is determined to “pass through” POTWs when the median percentage removed by well-operated POTWs is less than the median percentage removed by direct dischargers complying with BAT effluent limitations. In this manner, EPA can ensure that the combined treatment at indirect discharging facilities and POTWs is at least equivalent to that obtained through treatment by direct dischargers.

This approach to the definition of pass-through satisfies two competing objectives set by Congress: (1) that standards for indirect dischargers be equivalent to standards for direct dischargers, and (2) that the treatment capability and performance of POTWs be recognized and taken into account in regulating the discharge of pollutants from indirect dischargers. Rather than compare the mass or concentration of pollutants discharged by POTWs with the mass or concentration of pollutants discharged by BAT facilities, EPA compares the percentage of the pollutants removed by BAT facilities to the POTW removals. EPA takes this approach because a comparison of the mass or concentration of pollutants in POTW effluents with pollutants in BAT facility effluents would not take into account the mass of pollutants discharged to the POTW from other industrial and non-industrial sources, nor the dilution of the pollutants in the POTW effluent to lower concentrations from the addition of large amounts of other industrial and non-industrial water.

In selecting the regulated pollutants under the pretreatment standards, EPA starts with the priority and nonconventional pollutants regulated for direct dischargers under BAT for each subcategory and submits those pollutants to the pass-through test. Those pollutants that EPA determines pass through POTWs are the pollutants EPA proposes to regulate.

For the final iron and steel rule, EPA revised limitations for metallurgical cokemaking and sintering operations, and codified new limitations for direct-reduced ironmaking, briquetting, and forging. EPA conducted the POTW pass-through analysis for all regulated pollutants for by-product recovery cokemaking. EPA did not conduct its traditional POTW pass-through analysis for non-recovery cokemaking and briquetting because limitations for these operations for direct dischargers consist of no discharge of process wastewater pollutants to waters of the U.S[2]. For sintering, EPA is promulgating new limitations for only one parameter, 2,3,7,8-TCDF, leaving unchanged the existing limitations for all other parameters. Accordingly, EPA's POTW pass-through analysis for sintering is limited to consideration of 2,3,7,8-TCDF. Finally, EPA did not conduct the POTW pass-through analysis for direct-reduced ironmaking and forging because TSS and O&G are the only regulated pollutants for direct dischargers.

The following subsections present the POTW pass-through analysis:

- Methodology for determining BAT percent removals;
- Methodology for determining POTW percent removals; and
- Results of the POTW pass-through analysis.

12.2.1 Methodology for Determining BAT Percent Removals

To calculate BAT percent removals for the final iron and steel rule, EPA started with the same datasets used to calculate the long-term averages (LTAs) for the selected BAT or NSPS technology option. EPA then used the following methodology to calculate the percent removal:

[2]To ensure standards for indirect dischargers be equivalent to limitations for direct dischargers, EPA similarly designates standards for these subcategories and segments as zero discharge.

1) For each pollutant and each site for which EPA had paired influent and effluent data, EPA averaged the influent data and effluent data to give an average influent and effluent concentration, respectively.

2) EPA calculated percent removals for each pollutant for each site from the average influent and effluent concentrations using the following equation:

$$\text{Percent Removal} = \frac{\text{Average Influent Concentration} - \text{Average Effluent Concentration}}{\text{Average Influent Concentration}} \times 100 \qquad (12\text{-}1)$$

3) If EPA calculated percent removals for multiple BAT sites for a pollutant, EPA used the median percent removal for that pollutant from the facility-specific percent removals as the BAT option percent removal.

12.2.2 Methodology for Determining POTW Percent Removals

EPA generally calculated pollutant percent removals at POTWs nationwide from two available data sources:

- Fate of Priority Pollutants in Publicly Owned Treatment Works, September 1982, EPA 440/1-82/303 (50 POTW Study); and

- National Risk Management Research Laboratory (NRMRL) (formerly called the Risk Reduction Engineering Laboratory (RREL) database).

When available for a pollutant, EPA used data from the 50 POTW Study. For those pollutants not covered in the 50 POTW Study, EPA used NRMRL data. The 50 POTW Study presents data on the performance of 50 well-operated POTWs that employ secondary treatment to remove toxic pollutants. EPA edited the data to minimize the possibility that low POTW removals might simply reflect low influent concentrations instead of treatment effectiveness. The criteria used in editing the 50-POTW study data for this rule are listed below (same applicable criteria applied in the Centralized Waste Treatment (CWT) rulemaking):

1) Substitute the standardized pollutant specific analytical ML for values reported as “not detected,” “trace,” “less than (followed by a number),” or a number less than the standardized ML; and

2) Retain pollutant influent and corresponding effluent values if the average pollutant influent level is greater than or equal to 10 times the pollutant minimum analytical detection limit (ML).

For each POTW that had data pairs that passed the editing criteria, EPA calculated its percent removal for each pollutant using Equation 12-1. EPA then used the median value of all the POTW pollutant specific percent removals as the nationwide percent removal in its pass-through analysis.

The NRMRL database, used to augment the POTW database for the pollutants that the 50 POTW Study did not cover, is a computerized database that provides information, by pollutant, on removals obtained by various treatment technologies. The database provides the user with the specific data source and the industry from which the wastewater was generated. For each of the pollutants regulated at BAT that were not found in the 50-POTW database, EPA used data from portions of the NRMRL database. EPA applied the following editing criteria (also used by the CWT rulemaking):

1) Only treatment technologies representative of typical POTW secondary treatment operations (activated sludge, activated sludge with filtration, aerated lagoons) were used;

2) Only information pertaining to domestic or industrial wastewater were used;

3) Pilot-scale and full-scale data were used, while bench-scale data were eliminated; and

4) Only data from peer-reviewed journals or government reports were used.

Using the NRMRL pollutant removal data that passed the above criteria, EPA calculated the average percent removal for each pollutant.

For the pollutant 2,3,7,8-TCDF, no data were available in the 50 POTW Study or the NRMRL Treatability Database. For 2,3,7,8-TCDF, the POTW percent removal was transferred from two other dioxin/furan compounds, 1,2,3,4,6,7,8-HPCDD and 1,2,3,4,6,7,8-HPCDF (Reference: Transportation Equipment Cleaning Rulemaking Record (Section 18.4): data source listed as NRMRL Treatability Database).

12.2.3 Results of POTW Pass-Through Analysis

The following subsections provide the results of EPA's pass-through analyses for the by-product recovery cokemaking subcategory.

By-Product Recovery Cokemaking

As explained above, in conducting its traditional pass-through analysis, EPA compares the pollutant's percent removal by direct dischargers complying with BAT to the pollutant's percent removal by well-operated POTWs achieving secondary treatment. Since the technology bases for PSNS and BAT are equivalent, EPA concluded its traditional pass-through analysis is appropriate to use in evaluating PSNS. The following table presents a comparison of

BAT percent removals and POTW percent removals for the by-product recovery segment in the cokemaking subcategory using the methodology described above.

Preliminary POTW Pass-Through Analysis
Cokemaking (By-Product Recovery Segment) - PSNS

Pollutant	BAT % Removal	POTW % Removal (Reference)	BAT% Removal > POTW % Removal?	Does Pollutant Pass Through?
Ammonia-N	98%	39% (a)	Yes	Yes
Benzo(a)pyrene	96%	95% (b)	Yes	Yes
Naphthalene	≥99.9%	95% (a)	Yes	Yes
Phenols (4AAP)	≥99.9%	77% (a)	Yes	Yes
Total Cyanide	99%	70% (a)	Yes	Yes

(a) Source: U.S. EPA's 50 POTW Study, with data editing criteria such that only data pairs (influent and effluent) with influent ≥ 10 x ML were used. (See W-00-25, Section 5.4, DCN IS04612).
(b) Souce: U.S. EPA's NRMRL database. (See W-00-25, Section 5.4, DCN IS04620).

However, for this final rule, EPA has concluded that it is inappropriate for EPA to base its PSES pass-through analysis on the selected BAT technology basis for direct dischargers in this segment. The BAT technology consists of: oil and tar removal, equalization, fixed and free ammonia stripping, heat exchanger, equalization tank, biological treatment with nitrification followed by secondary clarification. The selected PSES technology basis for the final standards (PSES1) is similar to the BAT technology but does not include biological treatment with nitrification and secondary clarification. Because EPA determined the addition of a biological treatment system is not economically achievable for existing indirect dischargers, EPA has concluded that the proper technology basis for the pass-through analysis is the BAT-equivalent for indirects, in this case PSES1. The following table presents a comparison of BAT-equivalent percent removals and POTW percent removals for PSES in the by-product recovery segment in the cokemaking subcategory.

Preliminary POTW Pass-Through Analysis
Cokemaking (By-product Recovery Segment) - PSES

Pollutant	BAT-Equivalent % Removal	POTW % Removal (Reference)	BAT% removal > POTW % Removal?	Does Pollutant Pass Through?
Ammonia-N	76%	39% (a)	Yes	Yes
Benzo(a)pyrene	85.6%	95% (b)	No	No
Naphthalene	99.9%	95% (a)	Yes	Yes

Pollutant	BAT-Equivalent % Removal	POTW % Removal (Reference)	BAT% removal > POTW % Removal?	Does Pollutant Pass Through?
Phenols (4AAP)	25.6%	77% (a)	No	No
Total Cyanide	99.5%	70% (a)	Yes	Yes

(a) Source: U.S. EPA's 50 POTW Study, with data editing criteria such that only data pairs (influent and effluent) with influent $\geq$ 10 x ML were used. (See W-00-25, Section 5.4, DCN IS04612).
(b) Source: U.S. EPA's NRMRL database. (See W-00-25, Section 5.4, DCN IS04620).

In addition, as described below, EPA concluded its traditional analysis was not appropriate for phenols (4AAP) and ammonia-N discharged to POTWs that nitrify.

Phenols (4AAP) (PSES/PSNS):

Based on the POTW pass-through analysis shown above, EPA would establish PSNS for phenols (4AAP) for the byproducts segment of the cokemaking subcategory. However, for this final rule, as explained in the February 14, 2001 iron and steel notice (66 FR 10257), EPA used an alternate procedure to determine whether or not the phenolic compounds would pass-through for wastewater from by-product recovery cokemaking operations.

This notice explained that EPA planned to determine pass-through for phenol for the cokemaking subcategory using a methodology previously developed for phenol in the Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) guideline (pages III-6 and 7, and Appendix III-A, May 1993 Supplement to the OCPSF DD [EPA 821-R-93-007]). Under this methodology, EPA determined in the OCPSF rule that phenol did not pass through because phenol is highly biodegradable and is treated by POTWs to the same non-detect levels (10 parts per billion (ppb) or 10 µg/L) that the OCPSF direct dischargers achieve. Like the OCPSF direct dischargers, the cokemaking direct dischargers receive significantly higher influent phenol concentrations than the POTWs, with the result that the direct dischargers showed higher removals than the performance at the POTWs. Consequently, EPA concluded it was appropriate to apply this alternate pass-through methodology for phenolic compounds in by-product recovery cokemaking wastewaters also and accordingly determined that phenols (4AAP) in by-product recovery cokemaking discharges does not pass through.

Ammonia-N (PSES/PSNS):

EPA received many comments concerning its pass-through methodology for ammonia-N. Some commenters noted that many POTWs incorporate nitrification into their operation and that EPA's POTW percent removal estimates where not representative of those types of operations. EPA agrees and had concluded that ammonia-N discharges in iron and steel wastewaters do not pass-through POTWs that nitrify. EPA is defining nitrification capability as described in the following paragraph.

POTWs with nitrification capability oxidize ammonium salts to nitrites (via Nitrosomas bacteria) and then further oxidize nitrites to nitrates via Nitrobacter bacteria to achieve greater removals of ammonia than POTWs without nitrification. Nitrification can be accomplished in either a single or two-stage activated sludge system. In addition, POTWs that have wetlands which are developed and maintained for the express purpose of removing ammonia with a marsh/pond configuration are also examples of having nitrification capability. Indicators of nitrification capability are: (1) biological monitoring for ammonia oxidizing bacteria (AOB) and nitrite oxidizing bacteria (NOB) to determine if the nitrification is occurring, and (2) analysis of the nitrogen balance to determine if nitrifying bacteria reduce the amount of ammonia and increase the amount of nitrite and nitrate.

Final Pass-Through Analysis for By-Product Recovery Cokemaking:

The following table lists the final determination for the POTW pass-through analysis in the by-product recovery cokemaking segment for existing and new indirect dischargers.

Final POTW Pass-Through Analysis
Cokemaking (By-Product Recovery Segment) - PSES/PSNS

Pollutant	Does Pollutant Pass Through-PSES?	Does Pollutant Pass Through-PSNS?
Ammonia-N	Yes (a)	Yes (a)
Benzo(a)pyrene	No	Yes
Naphthalene	Yes	Yes
Phenols (4AAP)	No	No
Total Cyanide	Yes	Yes

(a) EPA determined ammonia-N does not pass through POTWs that nitrify.

Sintering

The following table presents a comparison of BAT percent removals and POTW percent removals for the wet air pollution control system segment of the sintering subcategory using the traditional methodology described above.

POTW Pass-Through Analysis
Sintering Subcategory - PSES/PSNS

Pollutant	BAT % Removal	POTW % Removal (Reference)	Does Pollutant Pass Through?
2,3,7,8-TCDF	99 %	83 % (a)	Yes

(a) POTW% removal assumed to be equivalent to the percent removal for 1,2,3,4,6,7,8-HPCDD and 1,2,3,4,6,7,8-HPCDF (Reference: NRMRL Treatability Database).

Table 12-1

Pollutants Considered for Regulation for Direct Dischargers Cokemaking Subcategory - By-Product Recovery Segment

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively or Constantly Treated	Controlled Through Regulation of Another Parameter
Conventional pollutants	Biochemical oxygen demand 5-day (BOD_5)						✔
	Biochemical oxygen demand 5-day (BOD_5) - carbonaceous						✔
	Oil and grease measured as hexane extractable material (O&G)						✔ (b)
	Total suspended solids (TSS)						✔ (b)
Nonconventional pollutants, other (a)	Amenable cyanide						✔
	Ammonia as nitrogen (ammonia-N)						
	Chemical oxygen demand (COD)	✔					
	Fluoride			✔			
	Nitrate/nitrite	✔				✔	
	Phenols (4AAP)	✔ (c)					
	Thiocyanate					✔	
	Total petroleum hydrocarbons measured as silica gel treated hexane extractable material (SGT-HEM)	✔			✔		
	Total Kjeldahl nitrogen (TKN)	✔					
	Total organic carbon (TOC)	✔					
	Weak acid dissociable (WAD) cyanide						✔

Table 12-1 (Continued)

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively or Constantly Treated	Controlled Through Regulation of Another Parameter
Priority metals	Arsenic				✔		
	Mercury					✔	
	Selenium					✔	
Nonconventional metals	Boron			✔	✔		
Priority organic pollutants	Acenaphthene						✔
	Acenaphthylene						✔
	Anthracene						✔
	Benzene		✔				✔
	Benzidine				✔		
	Benzo(a)anthracene						✔
	Benzo(a)pyrene						
	Benzo(b)fluoranthene						✔
	Benzo(k)fluoranthene				✔		
	Benzo(ghi)perylene				✔		
	Chrysene						✔
	1,2-Dichloroethane		✔		✔		
	2,4-Dimethylphenol						✔
	Ethylbenzene		✔		✔		
	Fluoranthene						✔
	Fluorene						✔
	Indeno(1,2,3-cd)pyrene				✔		

Table 12-1 (Continued)

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively or Constantly Treated	Controlled Through Regulation of Another Parameter
Priority organic pollutants (continued)	Naphthalene		✔				
	Phenanthrene		✔				✔
	Phenol						✔
	Pyrene						✔
	Toluene		✔				✔
Nonconventional organic constituents	Aniline		✔				✔
	2,3-Benzofluorene		✔		✔		
	beta-Naphthylamine				✔		✔
	Biphenyl		✔		✔		
	2-Butanone				✔		
	Carbazole						✔
	Carbon disulfide		✔		✔		
	Dibenzofuran		✔				✔
	Dibenzothiophene		✔				✔
	4,5-Methylene phenanthrene						✔
	2-Methylnaphthalene		✔				✔
	1-Methylphenanthrene		✔		✔		
	m- + p-Xylene		✔				✔
	m-Xylene		✔				✔
	1-Naphthylamine				✔		✔
	n-Eicosane		✔				✔

Table 12-1 (Continued)

Pollutant Group	Pollutant of Concern	Bulk Parameter	Volatile Parameter	Treatment Chemical	Not Detected at Treatable Levels	Not Effectively or Constantly Treated	Controlled Through Regulation of Another Parameter
Nonconventional organic constituents (continued)	n-Hexadecane		✔				✔
	n-Octadecane		✔				✔
	o-Cresol						✔
	o- + p-Xylene		✔				✔
	o-Toluidine				✔		
	o-Xylene		✔				✔
	p-Cresol						✔
	Perylene				✔		
	2-Phenylnaphthalene		✔				✔
	2-Picoline						✔
	2-Propanone						✔
	Pyridine						✔
	Styrene		✔				✔
	Thianaphthene						✔
Other priority pollutant	Total cyanide						

(a) Nonconventional pollutants other than nonconventional metals and nonconventional organic pollutants.
(b) Already regulated for existing dischargers.
(c) EPA regulated phenols (4AAP) also referred to as total phenols as an indicator of the compounds phenol and 2,4-dimethylphenol.

Table 12-2

Henry's Law Constants for Organic Pollutants of Concern Cokemaking Subcategory - By-Product Recovery Segment

Pollutant	Henry's Law Constant ($atm \cdot m^3/mol$) (a)	Volatile Parameter?
1,2-Dichloroethane	9.14E-04	Y
1-Methylphenanthrene	> 1E-04	Y
2,3-Benzofluorene	> 1E-04	Y
2,4-Dimethylphenol	1.70E-05	
2-Methylnaphthalene	7.98E-04	Y
2-Phenylnaphthalene	> 1E-04	Y
2-Picoline	(b)	
4,5-Methylene Phenanthrene	(b)	
Acenaphthene	9.10E-05	
Acenaphthylene	(b)	
Acetone	2.10E-05	
alpha-Naphthylamine	1.11E-07	
Aniline	> 1E-04	Y
Anthracene	8.60E-05	
Benzene	5.55E-03	Y
Benzidine	3.88E-11	
Benzo(a)anthracene	1.00E-06	
Benzo(a)pyrene	4.90E-07	
Benzo(b)fluoranthene	1.22E-05	
Benzo(ghi)perylene	3.31E-07	
Benzo(k)fluoranthene	3.87E-05	
beta-Naphthylamine	(b)	
Biphenyl	4.80E-04	Y
Carbazole	<E-04	
Carbon Disulfide	1.20E-02	Y
Chrysene	1.50E-06	

Table 12-2 (Continued)

Pollutant	Henry's Law Constant (atm · m^3/mol) (a)	Volatile Parameter?
Dibenzofuran	> 1E-04	Y
Dibenzothiophene	4.40E-04	Y
Ethylbenzene	6.60E-03	Y
Fluoranthene	6.50E-06	
Fluorene	6.40E-05	
Indeno(1,2,3-cd)pyrene	1.60E-06	
m- + p-Xylene	7.00E-03	Y
m-Xylene	7.18E-03	Y
Methyl Ethyl Ketone	2.70E-05	
n-Eicosane	> 1E-04	Y
n-Hexadecane	> 1E-04	Y
n-Octadecane	> 1E-04	Y
Naphthalene	4.60E-04	Y
o- + p-Xylene	7.00E-03	Y
o-Cresol	1.60E-06	
o-Toluidine	1.98E-06	
o-Xylene	7.00E-03	Y
p-Cresol	1.00E-06	
Perylene	3.65E-06	
Phenanthrene	2.26E-04	Y
Phenol	4.54E-07	
Pyrene	5.10E-06	
Pyridine	2.10E-06	
Styrene	2.80E-03	Y
Thianaphthene	(b)	
Toluene	6.66E-03	Y

(a) Henry's Law Constants were obtained from the Development Document for the CWT Point Source Category.
(b) Volatility information not available.

SECTION 13

PRODUCTION-NORMALIZED FLOWS

This section describes the data sources and methodology EPA used to select the model production-normalized flows (PNFs) that EPA used to calculate the limitations and standards considered for the final rule. EPA considered good water management practices and decreased wastewater discharge volumes, which it considers to be key components of effective pollution control, in its selection of the model PNFs. Section 13.1 briefly describes the data sources (Section 3 discusses this in more detail) and gives a general overview of EPA's evaluation and selection of facility datasets that are the basis for selection of the model PNFs. Section 13.2 provides a general overview of EPA's selection of the model PNFs. Sections 13.3 through 13.9 provide detailed discussions of EPA's determination of the model PNFs for each subcategory. Table 13-1 summarizes the model PNFs selected for each subcategory.

13.1 Overview of Data Selection

To develop the PNFs, EPA used wastewater flow and production data reported by facilities in response to industry surveys. Specifically, EPA used 1997 wastewater discharge flow and production data reported for each manufacturing process (e.g., cokemaking, hot forming, surface coating). In the case of cokemaking, manufacturing process flow data were also supplemented by reported treatment system effluent flow data.

EPA expressed the PNFs in terms of gallons of wastewater discharged per ton of production (gpt) for all production operations. EPA normalized reported wastewater discharge flow rates by production because this allows direct comparison of wastewater discharge flow rates among facilities regardless of facility size. However, for certain wet air pollution control devices associated with steel finishing operations, EPA expressed PNFs in gallons per minute (gpm) since they are independent of production.

Except as noted, EPA used flow and production data reported by all facilities without editing or screening the data. The exceptions include data from a few facilities for a few operations where information was insufficient (i.e., incomplete) to calculate PNFs.

EPA used the industry survey data to identify every source of process wastewater generated by a manufacturing operation. EPA did not include non-process wastewater sources in calculating site-specific PNFs for the following reasons: (1) EPA calculated the amount of wastewater directly generated from manufacturing operations that displayed wastewater characteristics requiring treatment, and (2) non-process wastewater does not directly contact processed or raw materials as part of the manufacturing operations, and often does not need treatment. The largest source of non-process wastewater is noncontact cooling water, but other sources include storm water and ground water. The exception is non-process wastewater that enters the process wastewater systems as makeup water, is reused as process water, incorporated into the process water system, and captured in the process wastewater discharge flows. EPA supports reusing of noncontact cooling water and other non-process wastewater to reduce fresh water requirements in process operations. Accordingly, EPA included these flows in determining the site-specific PNFs. In developing the model PNFs, EPA did not consider noncontact cooling water and other non-process wastewaters that are commingled with process wastewater. The decision not to use these non-process wastewaters is consistent with EPA's past practice and with the implementation of effluent limitations in permits and pretreatment control mechanisms.

EPA recognizes that storm water, ground water, and certain other non-process wastewaters from iron and steel sites can become contaminated with a variety of pollutants from raw materials and finished products and may require treatment before discharge. Consequently, EPA provided §420.08 in the final regulation, which allows permitting authorities to provide for increased loadings for non-process wastewater defined in §420.02 in NPDES permits and pretreatment control mechanisms using best professional judgement (BPT), but only to the extent such non-process wastewaters result in an increased flow.

Some sites achieve zero discharge of process wastewater from all manufacturing operations by evaporation or contract hauling. In these cases, EPA did not use a PNF of zero, but rather used the wastewater blowdown rates reported by these facilities for each manufacturing process (e.g., vacuum degassing, casting, and hot forming). EPA changed its methodology after proposal in response to comments. EPA developed this methodology to ensure that the selected regulatory PNFs generally would not be based on evaporation or contract hauling of process wastewater. Other sites achieve zero discharge from a particular manufacturing process by using wastewater as process makeup water for other processes. In these cases (with a few exceptions described below), EPA did not assign a PNF of zero, but instead used the volume of blowdown water from these operations in its PNF analysis. This methodology is consistent with that used by EPA at proposal.

For certain manufacturing operations, such as acid pickling and alkaline cleaning, contract hauling of wastewater streams (e.g., spent pickling or cleaning solutions) is common practice and was considered by EPA in its PNF analysis. In these cases, including wastewater sources that are not discharged in the analysis would result in a high bias of regulatory PNFs. EPA did not want to develop a flow allowance in the effluent limitations for process wastewater streams that are seldom, if ever, discharged. Additionally, for certain manufacturing operations such as acid pickling and alkaline cleaning, reusing wastewater streams within the same finishing line is common practice, and EPA considered this practice in its PNF analysis. For example, pickling rinsewater may be reused as pickling bath makeup water or returned to the process bath. EPA did not want to double count the portion of rinsewater that is reused in its PNF analysis; therefore, the Agency did not include this recycle water in its calculation of the finishing PNFs. Note that these practices generally pertain to only a small portion of acid pickling and alkaline cleaning wastewater discharges.

13.2 <u>Overview of PNF Selection</u>

This section describes the general methodology EPA used to select the model PNFs. For each process operation, EPA first performed an engineering assessment of all available wastewater discharge data for all sites in each subcategory or segment and initially determined the model PNFs based on the best performing mills within a given subcategory or segment. EPA generally considered model PNFs that are currently achieved by a minimum of 30 percent of facilities as a reasonable initial assessment of the best performers. Next, EPA assessed whether all facilities within any given segment can achieve the selected PNFs. For this assessment, EPA considered a variety of factors that may affect the ability of facilities to achieve the model PNFs, such as type of process used, products produced, age of equipment and facilities, geographic location, size, and non-water quality environmental impacts. EPA also considered combinations of these factors and evaluated the pollutant control upgrades that EPA judged would be necessary for facilities to attain the model PNFs. In addition, EPA considered whether any individual facilities achieve the model PNFs and long-term averages (LTAs) simultaneously (development of the model LTAs is described in Section 14), but did not include this factor as a requirement in determining the model LTAs and PNFs. EPA adjusted its initial determination of the model PNFs as necessary based on this assessment.

In response to comments on the proposed rule, EPA also evaluated the effect of seasonal variation on PNFs. Monthly production and daily flow data were available for five sites, including four integrated steelmaking sites and one stand-alone finishing site. EPA did not observe a consistent relationship between season and water use. Although factors such as water system operation and control, product variations, type of product, maintenance schedules, and storm-water volumes may mask any association between season and water use, it is more likely that there is no seasonal variation for these processes.

EPA's methodology for selecting the model PNFs independent from the model LTAs is very similar to that used for the 1982 rule (and for many other rules developed for other industrial point source categories) and is reasonable. Comments submitted on the proposed rule suggested alternative approaches to determine the model PNFs, such as use of various statistical analyses. However, the results of the commenter's statistical analysis demonstrate that adopting such an approach would generate unreasonably high PNFs that are not technology-based (i.e., do not represent the best available technology) and do not consider other factors required by the CWA. (See EPA's response to comments submitted by the Steel Manufacturer's Association, DCN IS10230, comment excerpts 2 and 12). Therefore, EPA disagrees with commenters that a statistical analysis is the best methodology to develop the model PNFs and has retained the methodology described above.

13.3 Subpart A: Cokemaking Subcategory

The cokemaking subcategory includes two segments: by-product recovery cokemaking and non-recovery cokemaking. EPA evaluated wastewater discharge flow rates separately for each segment as described in the following subsections.

13.3.1 By-Product Recovery Cokemaking

EPA analyzed industry survey responses for 23 sites that generate process wastewater (14 stand-alone by-product recovery coke plants and 9 by-product recovery coke plants at integrated mills) to develop the model PNF. One site is a zero discharger; this site disposes of its wastewater by a combination of coke quenching and deep-well injection. The Agency evaluated these 23 sites to develop a profile of the wastewater generated at by-product recovery cokemaking facilities.

By-product recovery coke plants generate a variety of process wastewater streams as described in detail in Section 7.1.1. As a starting point for developing the model PNF for the final rule, EPA considered the model PNF developed for the 1982 rule. EPA's approach for the 1982 rule in developing the model PNF was to first evaluate PNFs for each of the component flows listed in the table below. See Volume II of the 1982 Development Document (Reference 13-1). The sum of those component PNFs formed the base BAT PNF of 103 gpt for plants without biological treatment (i.e., most indirect discharge plans and one direct discharge plan); and 153 gpt for plants with biological treatment. The production basis was tons of coke produced and did not consider coke breeze production. For most coke plants, survey responses for the 1982 regulation provided sufficient detail on component flows to permit detailed assessments of each component flow.

Process Wastewater Flow Component	**1982 Regulation**		**2002 Final Rule**
Base flows applicable to all plants	Iron & Steel	Merchant	All coke plants
Waste ammonia liquor	32	36	32
Crude light oil recovery	25	28	25
Final gas cooler condensate	10	12	10
Coke oven gas condensate	Not considered	Not considered	3
Barometric condenser blowdown	3	5	3
Steam/caustic for ammonia still	13	15	10
Miscellaneous	20	24	20
NESHAPs controls	Not considered	Not considered	10
Base flow	103	120	113
Control water - biotreatment	50	50	50
Base flow with control water	153	170	163
Optional flows up to maximum amounts shown			
Wet coke oven gas desulfurization	25	25	15
Indirect ammonia recovery	60	60	NA
Unregulated WAPC flows	Not considered	Not considered	Design basis
Coke plant ground-water remediation	Not considered	Not considered	Design basis
Process area storm water	Not considered	Not considered	Design basis

Next, EPA assessed the 1997 survey data for each of the component flows to determine whether 1982 PNFs were still applicable and achievable. The results of this assessment are summarized here, and detailed support documentation is located in the Iron and Steel Administrative Record (Section 14.1, DCN IS10362 and Section 14.1, DCN IS10824 in the rulemaking record). Note that, for this assessment, EPA used a revised production basis of tons of coke plus coke breeze produced. Coke breeze production ranges widely from 1.3 percent to 7.9 percent of total production for furnace coke producers and 5.6 percent to 8.9 percent for foundry coke producers. Consequently, EPA believes that total production measured as coke plus coke breeze provides a more representative and more comparable measure of total coke produced. Based on this reassessment, EPA found no basis for revising many of the component flows. For other component flows, EPA considered whether current reported flow rates warranted development of revised component PNFs.

A principal limitation of the 1997 survey data centered around reported waste ammonia liquor flows. Waste ammonia liquor represents the moisture in the coal charged to the coke ovens, generally 7 percent to 9 percent by weight. Unlike other coke plant process wastewaters and process wastewaters from other iron and steel operations, waste ammonia liquor is a flow derived from the raw material. Many coke producers reported the total of their ammonia still effluent flows as waste ammonia liquor. Waste ammonia liquor flow rates reported in response to the 1997 industry survey ranges from 26 to 270 gpt, with a median flow rate of 69 gpt. Where data were reported for coal charged and coal moisture, EPA estimated waste ammonia liquor flows based on reported coal moisture data (Section 14.1, DCN IS10882 in the rulemaking record). Such data was reported for 6 coke facilities. These results are comparable to those reported in the 1982 Development Document, and are considerably less than the waste ammonia liquor flows reported in the 1997 survey without consideration of coal moisture data. Taking into consideration coal moisture data, EPA decided to retain the waste ammonia liquor PNF from the 1982 rule, 32 gpt, for the final rule.

EPA's assessment of the 1997 industry survey data also supported retaining the following additional 1982 component flows: 25 gpt for crude light oil recovery, 10 gpt for final gas cooler condensate, 3 gpt for barometric condenser condensate, and 20 gpt for miscellaneous flows.

EPA developed an additional component flow of 3 gpt for coke oven gas condensates, which was not considered in 1982. This represents the average reported flow for coke oven gas condensates. This additional flow allowance was offset by a reduction of 3 gpt in the flow for ammonia still steam and caustic based on 1997 industry survey data. The 1982 flow allowance for ammonia still steam and caustic was 13 gpt. The average flow reported in 1997 for caustic solution from ammonia stills was less than 1 gpt, while the average flow reported in 1997 for steam condensate from ammonia stills was 9 gpt. Thus, EPA selected an allowance of 10 gpt for ammonia still steam and caustic. Finally, EPA developed an additional component flow of 10 gpt for NESHAPs control water, which was not considered in 1982. This represents both the median and the average reported flow for NESHAPs control water.

EPA retained the 1982 rate of 50 gpt for control water used in optimizing coke plant biological treatment systems. This control water allowance is based on control water use reported by several plants, including one of the sites that operates model BAT wastewater treatment. EPA compared the PNFs achieved by sites with and without biological treatment, which demonstrated that sites with biological treatment use more water, in the form of control water. Accordingly, as described in the February 14, 2001 Notice of Data Availability (66 FR 10253), EPA has removed the control water flow allowance from the base PNF. Instead, EPA provided this additional flow allowance only to those plants that operate coke plant biological treatment systems. This change will result in more stringent limitations applicable to by-product recovery coke plants that do not operate coke plant biological treatment systems.

The net result of EPA's assessment was a revision of the base PNF from 103 gpt to 113 gpt (excluding control water). This represents an increase of 10 gpt from the 1982 flows; however, considering that the production basis for these PNFs includes both coke and coke breeze, these PNFs represent a slightly greater increase in absolute flow than 10 gpt.

The final rule also provides additional flow allowances of 50 gpt for control water for operation of biological treatment (described above), 15 gpt for wet coke oven gas desulfurization systems (revised from 25 gpt provided in the 1982 rule), and permit writer-derived flows for other wet air pollution control systems (except those from coal charging and coke pushing emission controls), coke plant groundwater remediation systems, and storm water from the immediate process area. EPA's revision of the flow allowance for wet coke oven gas desulfurization is based on EPA's assessment of flow rates reported in the 1997 survey response. The average reported flow rate for wet coke oven gas desulfurization was 15 gpt. The final rule does not provide a flow allowance for indirect ammonia recovery, which was considered in the 1982 rule, because this technology is no longer used.

EPA had proposed to increase the base PNF by 5 gpt to provide an allowance for process area storm water. For the final rule in response to comments, EPA has changed the method of accounting for process area storm water to better address the variability in storm water management practices at coke plants and allow for expected future increases in treating storm water from process areas. Specifically, EPA removed the 5 gpt stormwater flow allowance and instead provided a provision at §420.07(d) to allow permit writers to determine a more accurate allowance for storm water based on each site individually. Section 17 provides guidance to permit writers on providing reasonable stormwater allowances.

EPA excluded from its PNF analysis wastewater generated from wet air pollution control (WAPC) devices used to control emissions from operations such as coal charging, coke pushing, and by-product recovery. For WAPC wastewaters from coal charging and coke pushing, standard industry practice is to dispose of these wastewaters by coke quenching. The Agency supports this practice because these WAPC wastewaters, unlike some other untreated process wastewaters, do not contain volatile pollutants. Only two sites generate by-product WAPC wastewaters; therefore, EPA did not include this flow in its determination of the base PNF for the entire industry segment.

Finally, EPA performed a comprehensive assessment to determine whether any factors would prevent a facility from achieving the selected PNF. EPA included the factors listed in the CWA and others identified by proposal commenters. These factors are process, age of equipment and facilities, location, size, and non-water quality environmental impacts such as energy. Each is discussed in more detail below.

Process - Two types of coke are produced at by-product recovery cokemaking sites: blast furnace coke and foundry coke, with foundry coke requiring a longer coking time. The cokemaking plants are also either stand-alone or collocated with integrated iron and steel mills. All coke plant types (i.e., furnace, foundry, stand-alone, and collocated) are demonstrated to achieve the PNF performance level.

EPA also did not identify any basis to distinguish between merchant (i.e., stand-alone) coke producers and integrated coke facilities. Although merchant coke producers are smaller and produce less coke, this difference is accounted for in the calculation of a production-normalized flow. Furthermore, EPA's analysis shows that some merchant coke producers achieve the model PNF, demonstrating that the model PNFs are achievable.

Age of equipment and facilities involved - One site began battery operations in 1903 and 1913 and has not had a major rebuild since then. This site's PNF is more than double the PNF performance level. This plant is unique because of its obvious antiquated operation and control equipment as observed during engineering site visits. However, EPA determined that these antiquated systems do not preclude the plant from achieving the PNF performance level. This site should be able to meet the PNF with tighter operation practices and repairs to the system. EPA considered the costs required for this site to achieve PNF performance level in its analyses for the final rule.

Otherwise, sites without biological treatment that achieve the 113-gpt performance level and sites with biological treatment that achieve the 163-gpt performance level include both the oldest and the newest systems.

Location - EPA compared cokemaking site location to performance. Sites without biological treatment that achieve the 113-gpt performance level and sites with biological treatment that achieve 163 gpt are located in a variety of areas, including arid and semi-arid regions and northern and southern regions.

Size - EPA compared cokemaking production to performance. Sites without biological treatment that achieve 113 gpt and sites with biological treatment that achieve 163 gpt include both the largest and smallest sites.

Non-water quality environmental impacts, including energy - Non-water quality environmental impacts are not a significant consideration for cokemaking. Because the model PNF has been largely retained from the 1982 rule, any impacts have already occurred. The incremental non-water quality environmental impacts and energy consumption associated with achieving the model PNF are minimal. One plant that was believed to have limitations on cooling tower operations was determined to have no limits or restrictions for cooling tower air emissions.

Finally, EPA considered whether any of the cokemaking sites whose wastewater treatment performance data were used to develop the model LTAs achieve the model PNF. All three BAT treatment technology sites meet the model PNF.

13.3.2 Non-Recovery Cokemaking

EPA analyzed industry survey responses for two stand-alone non-recovery coke plants; one of these plants began operations after 1997, but was used in the flow rate analysis to increase the dataset. Section 7.1.1 describes water use and wastewater generation at non-recovery coke plants. Neither site generates process wastewater related to cokemaking, other than boiler blowdown and process area storm water, which are typically disposed of by coke quenching. Therefore, EPA has designated non-recovery cokemaking as a zero discharge operation.

13.4 Subpart B: Ironmaking Subcategory

The proposed ironmaking subcategory has three segments: sintering with wet air pollution controls, sintering with dry air pollution controls, and blast furnace ironmaking. EPA evaluated wastewater discharge flow rates separately for each segment as described in the following subsections. The results of this evaluation are summarized here, and detailed support documentation is located in the Iron and Steel Administrative Record (Section 14.1, DCN IS10359 and Section 14.1, DCN IS10824 in the rulemaking record). Note that, for the final rule, EPA decided to retain the subcategorization structure from the 1982 rule, which includes separate subcategories for sintering and ironmaking operations. Except for sintering, the final rule retains the limitations and standards from the 1982 rule. EPA promulgated a new limitation for 2,3,7,8-tetrachlorodibenzofuran for sintering operations with wet air pollution controls. This section describes the model PNFs that EPA developed for technology options considered for the final rule, but ultimately rejected.

13.4.1 Sintering With Wet Air Pollution Controls

EPA analyzed industry survey responses for six sintering plants with WAPC in operation in 1997 to develop the model PNF considered for the final rule for this industry segment. Of these six sintering plants, one plant has since changed to dry air pollution control and another plant has shut down. Of the four remaining plants, three cotreat sintering wastewater with blast furnace wastewater, and one cotreats sintering wastewater with other steelmaking wastewaters.

The primary process wastewater source for sintering operations is WAPC system wastewater, and EPA considered reported WAPC discharge flow rates to determine the model PNF. Facilities identified other sources of sintering wastewater in the 1997 survey, including sinter cooling water, belt sprays, and equipment cleaning water. The Agency believes these wastewaters are discharged with the WAPC blowdown because respondents did not provide flow rate data for these sources.

Review of the dataset suggests three possible model PNFs: 7, 75, and 110 gpt. These correspond to recycle rates of 99.6 percent, 96.9 percent, and 90.3 percent, respectively. EPA rejected a PNF of 7 gpt because of substantial costs required to achieve this performance level and concerns whether all plants could achieve this. However, a PNF of 110 gpt does not represent the greatly improved performance achieved by sinter plants since the 1982 regulation. Therefore, EPA initially considered 75 gpt as the model PNF for three reasons. First, the performance level is representative of well-operated, high-rate recycle systems. Second, the performance level represents a significant improvement in performance from the current regulation. Third, a significant portion of the plants operating in 1997, two of the six plants or 33 percent, achieve the performance level, suggesting it is demonstrated and achievable. Of the plants that achieve the performance level, one is stand-alone and one is a combined wastewater treater.

Next, EPA assessed the following factors to determine whether any suggested that a model PNF of 75 gpt is not technically achievable.

Process - The two plants used to select the model PNF are representative of other sinter operations in that they generate wastewater from emissions control from the windbox and other sources typical of sinter plants operating WAPC systems. EPA did not receive any comments on the proposed rule suggesting that sintering process considerations affect the technical achievability of the model PNF, nor is it aware of any such considerations that would impact the technical achievability of the model PNF.

Age of equipment and facilities involved - Review of the dataset indicates that age is not a significant factor in selecting a model PNF. All of the plants began operations within 30 years of each other. Of the two plants that achieve the model PNF, one is among the oldest plants and the other is not. Thus, age is not considered a significant factor for selecting a PNF for sintering.

Location - Sinter plants are located predominantly in the midwestern part of the country, with one located in the east. The two plants that achieve the model PNF are both located in the Midwest. However, EPA did not collect, nor did industry provide, any information or data that indicates location is a significant factor in selecting a PNF.

Size - EPA compared sinter plant production to performance. Sites achieving the model PNF of 75 gpt include both the largest and smallest sites.

Non-water quality environmental impacts, including energy - Non-water quality environmental impacts related to high-rate recycle systems are not a significant consideration for sintering. Because the wastewater discharged from sintering operations makes up such a small portion of the wastewater discharged at sites with sintering, any incremental non-water quality costs associated with increasing recycle rates at these sites are minimal.

Finally, EPA considered whether the plant whose wastewater treatment performance data were used to develop the model LTAs achieves the model PNF or operates a high-rate recycle system. The plant does not achieve the model PNF, but does operate a high-rate recycle system (operated at less than capacity). Current NPDES permits issued under the 1982 regulation do not require optimization of recycle systems and minimizing blowdown rates to the level considered by EPA for the final rule. Although EPA considers the model PNF to be demonstrated and achievable by all plants, several plants do not achieve the model PNF and have had no incentive to do so.

13.4.2 Sintering With Dry Air Pollution Controls

EPA analyzed industry survey responses for two sinter plants; one of these plants converted from wet to dry air pollution controls after 1997, but completed their survey response based on the revised process. Neither plant reported generating any process wastewater; therefore, EPA has designated sintering with dry air pollution controls as a zero discharge operation.

13.4.3 Blast Furnace Ironmaking

EPA analyzed industry survey responses for each blast furnace wastewater treatment system in operation in 1997 to develop the ironmaking model PNF considered by EPA for the final rule. Depending on the site, these systems treat wastewater from one or more blast furnaces; some sites operate more than one ironmaking wastewater treatment system. EPA calculated and evaluated PNFs for a total of 24 wastewater treatment systems servicing a total of 41 blast furnaces. One furnace was not in operation in 1997 and was not included in the PNF analysis.

Blast furnaces generate a variety of process wastewater streams, as described in detail in Section 7.1.2. Blowdown from the high-energy scrubbers and gas coolers are the primary wastewater source from blast furnace ironmaking, and common industry practice is to reuse other ironmaking process wastewaters as makeup for the gas cleaning system. Accordingly, EPA developed the model PNF considered for the final rule for ironmaking based on reported gas cleaning system blowdown rates.

To facilitate review of this relatively large dataset, EPA plotted the PNF of each blast furnace water system against its PNF and percent recycle. Based on a review of the plot, EPA considered 25 gpt, which corresponds to a recycle rate of approximately 98 percent or greater, as an initial determination of the model PNF. EPA had three reasons for this. First, the performance level is representative of well-operated, high-rate recycle systems. Second, the performance level represents a significant improvement in performance from the current regulation. Third, a significant portion of the blast furnace water systems operating in 1997, 8 of the 24 systems operating in 1997 or 33 percent, achieve the performance level, suggesting it is demonstrated and achievable.

Note that six ironmaking wastewater treatment systems achieve zero discharge and four ironmaking wastewater treatment systems achieve reduced discharge of blast furnace wastewater by using all or a portion of gas cleaning blowdown for slag quenching. One additional system achieves zero discharge by discharging gas cleaning blowdown to one unlined and one synthetically lined pond where the wastewater infiltrates the ground and evaporates. The Agency did not consider selecting a model PNF based on zero discharge because it does not believe that the practice of using untreated gas cleaning blowdown for slag quenching in unlined slag pits constitutes BAT, because this practice can cause ground-water contamination and air pollution.

Next, EPA assessed the following factors to determine whether any suggested that a model PNF of 25 gpt is not technically achievable.

Process - Since promulgation of the 1982 regulation, there have been many advances in blast furnace operations, most of which are associated with use of supplemental carbonaceous fuels to replace a portion of the coke charge and other injectants. The principal process difference among blast furnaces is raw materials used, which is influenced by many factors including size (and age) of the furnace, availability of sinter, and changes in prices for natural gas and other injectants such as pulverized and granulated coal.

Representatives from Ispat-Inland Steel commented during EPA/industry meetings subsequent to proposal that using pulverized coal injection (PCI) at Ispat-Inland's No. 7 furnace has led to severe corrosion in the Bischoff scrubber used for gas cleaning. Operators have had to increase the blowdown rate from 43 gpt in 1997 to approximately 70 gpt to control high chloride levels and minimize corrosion.

Based on this comment, EPA evaluated the reported injection rates for pulverized and granulated coal (PCI/GCI) in 1997. All but two sites with furnaces using PCI/GCI reported PNFs at or below 70 gpt in 1997. One of these sites operates a high-rate recycle system that is not optimized for minimal blowdown, and the second site does not have a high-rate recycle system. Two sites using PCI/GCI reported PNFs below 25 gpt.

To obtain additional information to further evaluate the potential impact of PCI/GCI on the achievability of the model PNF, EPA contacted representatives of Ispat-Inland Steel, Bethlehem Steel, and U.S. Steel to review current blast furnace operations and operating practices to minimize corrosion in blast furnace treatment and recycle systems. Contact reports are included in the Iron and Steel Administrative Record (Section 14.1, DCN IS10359 in the rulemaking record). The review focused on furnaces using PCI; the objective was to collect information to help determine appropriate blowdown rates for blast furnace operations using PCI/GCI.

Site personnel provided detailed descriptions and supporting data demonstrating that corrosion has become a significant issue with using PCI to increase furnace productivity. Site contacts indicated that it is likely that PCI use as a coke substitute will increase in the future, thus increasing the concentrations of chlorides and the potential for corrosion. Increased use of

PCI at any size furnace may become more attractive during periods when natural gas prices are high. Furnace operators report that chloride concentrations in the range of 1,500 to 2,000 mg/L are tolerable with increased treatment of the recirculating water with corrosion inhibitors. Site personnel indicated that this range can be maintained with the model PNF of 70 gpt developed for the 1982 rule.

Commenters also indicated that blast furnaces operating with high top pressures (generally greater than 20 psig) would not be able to meet the model PNF. Consequently, EPA evaluated the relationship between blast furnace top pressure and PNF and found a correlation between the two. Four blast furnace systems that operate with high top pressures do not achieve the model PNF. These four furnaces are the newest, largest furnaces in operation; they all also use PCI. Therefore, consideration of PCI in selecting a model PNF coincidentally addresses possible issues related to high top pressures and the technical achievability of the model PNF.

Finally, commenters discussed the impact of high-rate recycle on wastewater total dissolved solids (TDS) concentrations and resulting scaling of equipment. Industry attendees at the EPA/Industry meeting on April 24, 2001 mentioned studies that were performed to evaluate scaling issues. EPA requested copies of these studies, but the reports were not provided to the Agency. During the meeting, attendees indicated that a blowdown rate of 70 to 100 gpt is required to avoid scaling problems. However, a large percentage of sites have been operating high-rate recycle systems at blowdown rates significantly less than this level and managing water chemistry effectively. EPA considered costs for increased dosage of water additives such as scale inhibitors. Lacking further substantiating data, EPA concludes that TDS/scaling issues do not significantly affect the technical achievability of the model PNF.

Age of equipment and facilities involved - Systems that achieve the model PNF include both the oldest and newer furnaces. However, blast furnaces must be rebuilt from time to time to replace refractories and worn mechanical equipment and to implement process upgrades. Major rebuilds historically have occurred about every 7 years, but current practice is to extend the time between rebuilds to 10 years and longer. Facilities do repairs and minor upgrades more frequently. Because of the extensive nature of these rebuilds, the age of a blast furnace may be best represented by the date of the last major rebuild. Again, systems that achieve the model PNF are not correlated to the period of time since the last major rebuild.

Age is indirectly related to the ability to maintain low PNFs. Based on facility contacts, relatively high rates of PCI are more likely to be used in the larger, newer furnaces than in the smaller, older furnaces. (EPA notes that the newest furnaces have been in production for more than 20 to nearly 40 years.) As a result, EPA selected a model PNF that is achievable by both the older and newer furnaces.

Location - Most blast furnace operations in the United States are located in the midwestern part of the country (western Pennsylvania, West Virginia, Ohio, Kentucky, Indiana and Illinois). One furnace is located in the East, one in the Southeast, and one in the West. The primary engineering factors related to attaining low blowdown rates are: (1) isolation of noncontact cooling waters from the process water system; (2) isolation of excessive amounts of storm water and other extraneous sources of makeup water; (3) surge capacity to address hydraulic imbalances during furnace start-ups and shut downs; (4) adequate recirculating water cooling capacity; and, (5) control of circulating water chemistry to address fouling, scaling, and corrosion. EPA did not collect, nor did industry provide, any information or data that indicates that these factors are related to location to such a degree that EPA would consider segmentation on the basis of location.

Size - EPA compared blast furnace production to performance. Sites achieving the model PNF of 25 gpt include both the largest and smallest sites.

Non-water quality environmental impacts, including energy - Non-water quality environmental impacts associated with achieving low PNFs are atmospheric emissions of particulate matter from evaporation and drift from cooling towers and secondary environmental and energy impacts from manufacturing and using of recirculating water treatment chemicals. Differences in these factors over the relatively narrow range of PNFs under consideration (25 to 70 gpt) are not a significant consideration. Any impacts have already occurred because most blast furnaces have high-rate recycle systems. The incremental non-water quality environmental impacts and energy consumption associated with achieving the model PNF are minimal.

Finally, EPA considered whether any of the plants whose wastewater treatment performance data were used to develop the model LTAs achieve the model PNF, operate a high-rate recycle system, or operate PCI/GCI. Among these sites, one achieves the model PNF and all operate high-rate recycle systems. One site uses PCI.

Following its evaluation of the technology options for the final rule, EPA has retained a model PNF of 25 gpt for the reasons stated above. However, EPA agrees with the commenters that the model PNF developed for ironmaking is not technically achievable by all facilities in the subcategory for the reasons described previously. For this and other reasons stated in the preamble and elsewhere in this document, EPA has decided not to revise limitations and standards for ironmaking.

13.5 Subpart C: Integrated Steelmaking Subcategory

The proposed integrated steelmaking subcategory includes the following manufacturing operations conducted at integrated steel mills: basic oxygen steelmaking, ladle metallurgy, vacuum degassing, and continuous casting. In addition, within basic oxygen steelmaking operations EPA also considers the following three processes: semi-wet pollution controls, wet-open combustion, and wet-suppressed combustion. EPA evaluated wastewater discharge flow rates separately for each process operation as described in the following subsections. The results of this evaluation are summarized here, and detailed support documentation is located in the Iron and Steel Administrative Record (Section 14.1, DCN IS10441 and Section 14.1, DCN IS10824 in the rulemaking record). Note that, for the final rule, EPA decided to retain the subcategorization structure from the 1982 rule, which includes separate subcategories for steelmaking, vacuum degassing, and continuous casting. With the exception of semi-wet basic oxygen furnaces (BOFs), EPA also decided to retain the limitations and standards from the 1982 rule. This section describes the model PNFs that EPA developed for technology options considered for the final rule, but ultimately rejected.

Six of the 20 integrated steelmaking sites operate combined wastewater treatment and/or recycle systems for vacuum degassing, continuous casting, and/or hot forming operations. To calculate the site-specific PNF for a particular manufacturing operation that shares a combined treatment and/or recycle system with one or more other manufacturing operations, EPA apportioned the total system wastewater discharge flow by the percentage of the total treatment and/or recycle system influent wastewater flow from that process.

13.5.1 Basic Oxygen Furnace (BOF) Steelmaking

EPA analyzed industry survey responses for 24 integrated BOF shops in operation in 1997 to develop the steelmaking model PNFs that EPA considered for the final rule. Of the 24 BOF shops, 8 operate semi-wet air pollution control systems, 8 operate wet-open air pollution control systems, 7 operate wet-suppressed air pollution control systems, and 1 operates a combination wet-open/wet-suppressed air pollution control system.

Blowdown from air pollution control systems is the primary wastewater source from BOF steelmaking. Other minor process wastewater sources are site-specific and are either reused as makeup for the air pollution control systems or discharged separately to treatment. EPA excluded ground water from its PNF analysis; pollutant discharge allowances for these wastewaters are provided by regulatory mechanisms other than the limitations and standards considered by EPA for the final rule, as described in Section 13.1.

Semi-Wet Air Pollution Control

EPA first ordered the semi-wet BOF shops by PNF and assessed the distribution. Based on the distribution, EPA initially considered 10 gpt as the model PNF because a significant portion of the shops, four of the eight or 50 percent, currently achieve the performance level, suggesting it is widely demonstrated and achievable.

Note that two sites reported zero discharge of process wastewater, while one site reported a discharge of 1 gpt. Sites achieve zero or relatively low discharges from their semi-wet systems by balancing the applied water with water that evaporates in the conditioning system. Although the 1982 regulation designates semi-wet air pollution control as zero discharge, currently not all sites are able to achieve this because of safety considerations. Some sites operate their semi-wet systems with excess water, which is subsequently discharged, to flush the air pollution control duct work and prevent the buildup of debris within the ductwork. If this wet debris accumulates, it has the potential to fall back into the BOF, causing explosions and process upsets. The Agency recognizes the benefit of using excess water in these systems and, therefore, did not consider selecting a model PNF based on zero discharge.

Next, EPA assessed the following factors to determine whether any suggested that a model PNF of 10 gpt is not technically achievable.

Process - EPA assessed the type of wet air pollution control used compared to performance. As discussed above, four of the eight BOF shops using semi-wet air pollution control achieve the model PNF.

Age of equipment and facilities involved - EPA compared the first year of operation of each BOF shop to the PNF. All eight of these shops began production between 1959 and 1970. Shops that achieve the model PNF include both the oldest and the newest of these mills. Thus, age is not considered a significant factor for selecting a PNF for BOFs with semi-wet air pollution controls.

Location - EPA compared mill location and performance. Seven of the eight mills using semi-wet air pollution controls are located in the Midwest. The one mill with semi-wet air pollution control located outside the Midwest (Alabama) does not achieve the model PNF; however, EPA did not collect, nor did industry provide, any information or data that indicates this is due to location in a southern region.

Size - EPA compared production of BOFs with semi-wet air pollution controls to performance. Sites achieving the model PNF of 10 gpt include both the largest and smallest sites.

Non-water quality environmental impacts, including energy - Non-water quality environmental impacts related to water conservation are not a significant consideration for BOF steelmaking with semi-wet air pollution control. Any impacts have already occurred because most BOFs either have high-rate recycle systems or discharge to high-rate recycle systems in other processes (e.g., vacuum degassing, continuous casting, hot forming). The incremental non-water quality environmental impacts and energy consumption associated with achieving the model PNF are minimal.

Next, EPA evaluated whether a combination of the factors listed above at specific shops might impact the technical achievability of the model PNF. EPA found that the combination of factors at mills that achieve the model PNF is comparable to the combination of factors at mills that do not achieve the model PNF.

Finally, EPA considered whether any of the BOF shops whose wastewater treatment performance data EPA used to develop the model LTAs achieve the model PNF. The two BAT treatment technology sites operate a total of six BOF shops, none of which operates a semi-wet air pollution control device.

Wet-Open Air Pollution Control

EPA first ordered the wet-open BOF shops by PNF and assessed the distribution. Review of the distribution suggested possible model PNFs of 0, 46, 86, and 103 gpt. These correspond to recycle rates of approximately 100 percent, 91.7 percent, 98.2 percent, and 88.3 percent, respectively. EPA rejected model PNFs of 0 and 46 gpt because of substantial costs needed to achieve these performance levels and concerns regarding technical achievability by all facilities. However, a model PNF of 103 gpt does not represent the greatly improved performance commonly achieved by mills since the 1982 regulation. Therefore, EPA initially considered 86 gpt as the model PNF for three reasons. First, the performance level is representative of well-operated high-rate recycle systems. Second, the performance level represents a significant improvement in performance from the current regulation. Third, a significant portion of the systems, four of the eight systems or 50 percent, currently achieve the performance level, suggesting it is widely demonstrated and achievable. A model PNF of 86 gpt is more than four times that considered by EPA for the proposed rule.

Next, EPA assessed the following factors to determine whether any suggested that a model PNF of 86 gpt is not technically achievable.

Process - EPA compared the type of wet air pollution control used to performance. As discussed above, four of the eight BOF shops using wet-open air pollution control achieve the model PNF.

Age of equipment and facilities involved - EPA compared the first year of operation of each BOF shop to PNF. All eight of these BOF shops using wet-open air pollution control began production within a relatively short period of time between 1964 and 1973; therefore, the range of ages is not significant. Thus, age is not considered a significant factor for selecting a PNF for BOFs with wet-open air pollution controls.

Location - BOF shops with wet-open air pollution control are not widely dispersed throughout the United States. Therefore, a comparison of location to performance is not relevant.

Size - EPA compared production of BOFs with wet-open wet air pollution controls to performance. Sites achieving the model PNF of 86 gpt include both the largest and smallest sites.

Non-water quality environmental impacts, including energy - Non-water quality environmental impacts related to high-rate recycle systems are not a significant consideration for BOF steelmaking with wet-open air pollution control. Any impacts have already occurred because most BOFs either have high-rate recycle systems or discharge to high-rate recycle systems in other processes (e.g., vacuum degassing, continuous casting, hot forming). The incremental non-water quality environmental impacts and energy consumption associated with achieving the model PNF are minimal.

Next, EPA evaluated whether a combination of the factors listed above at specific shops might impact the technical achievability of the model PNF. EPA found that the combination of factors at mills that achieve the model PNF is comparable to the combination of factors at mills that do not achieve the model PNF.

Finally, EPA considered whether any of the BOF shops whose wastewater treatment performance data EPA used to develop the model LTAs achieve the model PNF. The two BAT treatment technology sites operate a total of two BOF shops with wet-open air pollution control, both of which achieve the model PNF. Both operate recycle systems and use carbon dioxide injection in reducing blowdown rate.

Wet-Suppressed Air Pollution Control

EPA first ordered the wet-suppressed BOF shops by PNF and assessed the distribution. Review of the distribution suggested possible model PNFs of 22 and 48 gpt. These correspond to recycle rates of approximately 98.2 and 92 percent, respectively. EPA rejected a model PNF of 48 gpt because it does not represent the greatly improved performance commonly achieved by mills since the 1982 regulation. Therefore, EPA initially considered 22 gpt as the model PNF for three reasons. First, the performance level is representative of well-operated high-rate recycle systems. Second, the performance level represents a significant improvement in performance from the current regulation. Third, a significant portion of the systems, three of the seven systems or 43 percent, currently achieve the performance level, suggesting it is widely demonstrated and achievable.

Next, EPA assessed the following factors to determine whether any suggested that a model PNF of 22 gpt is not technically achievable.

Process - EPA assessed the type of wet air pollution control used compared to performance. As discussed above, three of the seven BOF shops using wet-suppressed air pollution control achieve the model PNF.

Age of equipment and facilities involved - EPA compared the first year of operation of each BOF shop to the PNF. Mills that achieve the model PNF include older mills. The oldest mill does not achieve the model PNF; however, EPA estimated costs for this facility to achieve the model PNF including costs to increase the BOF shop recycle rate from 87.9 percent to greater than 98 percent. EPA is not aware of any reason why age would impact the technical achievability of the model PNF.

Location - EPA compared system location to performance. Systems that achieve the model PNF are located mainly in the Midwest, as are most of the BOF shops using wet-suppressed air pollution control. Shops located outside the Midwest that do not achieve the model PNF use recycle rates less than 98 percent. EPA costed these mills to increase their recycle rates to greater than 98 percent. EPA is not aware of any reason why location would impact the technical achievability of the model PNF.

Size - EPA compared production of BOFs with wet-suppressed air pollution controls to performance. Sites achieving the model PNF of 22 gpt include both the largest and smallest sites.

Non-water quality environmental impacts, including energy - Non-water quality environmental impacts related to high-rate recycle systems are not a significant consideration for BOF steelmaking with wet-suppressed air pollution control. Any impacts have already occurred because most BOFs have high-rate recycle systems or discharge to high-rate recycle systems in other processes (e.g., vacuum degassing, continuous casting, hot forming). The incremental non-water quality environmental impacts and energy consumption associated with achieving the model PNF are minimal.

Next, EPA evaluated whether a combination of the factors listed above at specific shops might impact the technical achievability of the model PNF. EPA found that the combination of factors at mills that achieve the model PNF is comparable to the combination of factors at mills that do not achieve the model PNF.

Finally, EPA considered whether any of the BOF shops whose wastewater treatment performance data EPA used to develop the model LTAs achieve the model PNF. The two BAT treatment technology sites operate one BOF shop with wet-suppressed air pollution control. This site does not achieve the model PNF. This site does operate a high-rate recycle system, but at a recycle rate of less than 98.2 percent.

13.5.2 Ladle Metallurgy

None of the sites that use ladle metallurgy reported generating or discharging process wastewater from this operation; therefore, EPA has designated ladle metallurgy as a zero discharge operation.

13.5.3 Vacuum Degassing

EPA analyzed industry survey responses for 14 integrated vacuum degassing systems to develop the model PNF that EPA considered for the final rule. Blowdown from the vacuum generating system was the only reported source of process wastewater.

EPA first ordered the vacuum degassing systems by PNF and assessed the distribution. Review of the distribution showed a smooth progression of PNFs ranging from 0 to 177 gpt with no clear indicator of “best” performance. EPA rejected potential model PNFs ranging from 0 to 7 gpt because of substantial costs required to achieve this performance level and concerns regarding technical achievability by all facilities. As an initial determination of the model PNF, EPA considered 13 gpt, which corresponds to a general recycle rate of approximately 99 percent. EPA considers this performance to be representative of well-operated, high-rate recycle systems in this segment. The performance level also represents a significant improvement in performance from the current regulation. Third, a significant portion of the mills, 4 of the 11 mills or 36 percent, currently achieve the performance level, suggesting it is widely demonstrated and achievable.

Next, EPA assessed whether the model PNF of 13 gpt is technically achievable. Process water recycle systems at integrated mills are typically operated by mill personnel, and the chemistry within the systems is most often managed by chemical suppliers on a contract basis. Based on review of survey information and follow-up contacts with environmental control personnel and their chemical suppliers, EPA concluded that process water recycle system flows are often managed at levels below maximum design capacity. In other words, mills in this circumstance have some available hydraulic capacity to pump and cool more water through the systems than they currently process. Additionally, at many mills, the chemical suppliers determine blowdown rates and recycle system chemistry, with the proviso that they have to stay within permit limits. Current NPDES permits issued under the 1982 regulation do not require optimizing recycle systems and minimizing blowdown rates to the level of the model PNFs considered for the final rule. Although the PNFs discussed in this section are well demonstrated for all operations in this subcategory, many mills do not achieve the PNFs and have had no incentive to do so.

Next, EPA assessed the following specific factors to determine whether any suggested that a model PNF of 13 gpt is not technically achievable.

Process - EPA compared the type of vacuum degassing system used (i.e., Ruhrstahl-Heraeus, RH-OB, argon stirring, RH-KTB, vacuum tank degassing, VCP-KIB, induction stirring and MAN GHH VCP Vacuum Circulation Process) to performance. Both Ruhrstahl-Heraeus and vacuum tank degassing are demonstrated to achieve the model PNF. EPA cannot adequately assess whether these other systems can achieve the necessary recycle rate and model PNF because of the limited amount of data on their performance level and recycle rates. Additionally, several non-integrated sites using these types of vacuum degassing systems achieve the model PNF considered by EPA for integrated sites. EPA is not aware of any technical reasons why these systems at integrated sites would not be able to achieve the model PNF, and EPA has not received any comments suggesting that the type of vacuum degassing system used affects the technical achievability of the model PNF.

Age of equipment and facilities involved - EPA compared the first year of operation of vacuum degassing systems to the PNFs. Only one system began operations before 1987, but it is also not operating BAT model treatment technology. The relatively high PNF for this system is the result of leaks into the system, and EPA estimated costs required to mitigate these leaks. Otherwise, there is no correlation between the age of equipment and PNF.

Location - EPA compared system location to performance. The majority of systems analyzed are located in the Midwest. The one system located in a southern region does not achieve the model PNF, but it also does not achieve a recycle rate of 99 percent. EPA is not aware of any reason why this system or any other in a southern region would not achieve a recycle rate of 99 percent and the corresponding model PNF.

Size - EPA compared vacuum degasser production to performance. Sites achieving the model PNF of 13 gpt include both the largest and smallest sites.

Non-water quality environmental impacts, including energy - Non-water quality environmental impacts related to high-rate recycle systems are not a significant consideration for vacuum degassing. Any impacts have already occurred because most integrated vacuum degassing operations either have high-rate recycle systems or discharge to high-rate recycle systems in other processes (e.g., BOFs, continuous casting, hot forming). The incremental non-water quality environmental impacts and energy consumption associated with achieving the model PNF are minimal.

Next, EPA evaluated whether a combination of the factors listed above at specific systems might impact the technical achievability of the model PNF. EPA found that the combination of factors at mills that achieve the model PNF is comparable to the combination of factors at mills that do not achieve the model PNF.

Finally, EPA considered whether any of the sites whose wastewater treatment performance data EPA used to develop the model LTAs achieve the model PNF. The two BAT treatment technology sites operate a total of two vacuum degassers, one of which achieves the model PNF. This degasser operates a high-rate recycle system with BAT treatment. The remaining BAT treatment technology site also operates a high-rate recycle system, but at a recycle rate of less than 99 percent.

13.5.4 Continuous Casting

EPA analyzed industry survey responses for 31 integrated continuous casting systems to develop the model PNF that EPA considered for the final rule. EPA included in its PNF analysis reported discharge flow rates for process wastewaters, including contact spray cooling, flume flushing, and equipment cleaning wastewaters. EPA did not include non-process wastewater sources, such as low-volume losses from closed caster mold and machine cooling water systems, in its PNF analysis, for the reasons discussed in Section 13.1.

EPA first ordered the continuous casting systems by PNF and assessed the distribution. Review of the distribution suggested a model PNF of 5 gpt. EPA rejected potential model PNFs ranging from 0 to 5 gpt because of substantial costs required to achieve this performance level and concerns regarding technical achievability by all facilities. EPA initially considered the model PNF selected for the 1982 rule as the model PNF for this rule, 25 gpt, which corresponds to a general recycle rate of approximately 97.4 percent. EPA considers this performance to be representative of well-operated, high-rate recycle systems in this segment. Finally, a significant portion of the systems, 12 of the 24 systems or 50 percent, currently achieve the performance level, suggesting it is widely demonstrated and achievable.

Next, EPA assessed whether the model PNF of 25 gpt is technically achievable. Process water recycle systems at integrated mills are typically operated by mill personnel, and the chemistry within the systems is most often managed by chemical suppliers on a contract basis. Based on review of survey information and follow-up contacts with environmental control personnel and their chemical suppliers, EPA concluded that process water recycle system flows are often managed at levels below maximum design capacity. In other words, mills in this circumstance have some available hydraulic capacity to pump and cool more water through the systems than they currently process. Additionally, at many mills, the chemical suppliers determine blowdown rates and recycle system chemistry, with the proviso that they have to stay within permit limits.

Next, EPA assessed the following specific factors to determine whether any suggested that a model PNF of 25 gpt is not technically achievable.

Product Cast - EPA compared the type of product cast (i.e., billet, bloom, slab, thin slab, slab/bloom) to performance. The table below demonstrates that billet and slab process types achieve the model PNF.

Product Cast	Percentage of Facilities Achieving Target PNF
Billet	100%
Bloom	0%
Slab	42%
Thin Slab	0%
Slab/Bloom	0%

One site casts a combination of slabs and blooms, making it difficult to assess whether the model PNF is achievable by combination slab and bloom casters.

The two bloom casters achieve PNFs greater than 25 gpt. Both sites combine bloom casting wastewater with wastewaters from the BOF, vacuum degassing and other continuous casting operations. Both systems operate recycle systems. One site's treatment consists of a cooling tower, water filters, oil skimmer and scale pit. The other site operates a recycle system with treatment consisting of a cooling tower, water filter, oil skimmer, scale pit, and gravity thickener. Both sites with bloom casters can achieve the model PNF by increasing recycle rates from the combined treatment system.

One site casts thin slabs, making it difficult to assess whether the model PNF is achievable by thin slab casters. EPA created a separate segment for thin slab producers, including both integrated and non-integrated mills, based on industry trends toward thinner products that may require higher PNFs. Section 13.7.6 presents EPA's analyses for thin slab producers.

Age of equipment and facilities involved - EPA compared the first year of operation of continuous casting systems to PNFs. Systems that achieve the model PNF include both the oldest and the newest systems. Thus, age is not considered a significant factor for selecting a PNF for continuous casting operations at integrated mills.

Location - EPA compared system location to performance. Systems that achieve the model PNF are located in a variety of areas, including arid and semi-arid regions and northern and southern regions.

Size - EPA compared continuous caster production controls to performance. Sites achieving the model PNF of 25 gpt include both the largest and smallest sites.

Non-water quality environmental impacts, including energy - Non-water quality environmental impacts related to high-rate recycle systems are not a significant consideration for continuous casting. Any impacts have already occurred because most integrated continuous casters either have high-rate recycle systems or discharge to high-rate recycle systems in other processes (e.g., vacuum degassing or hot forming). The incremental non-water quality environmental impacts and energy consumption associated with achieving the model PNF are minimal.

Next, EPA evaluated whether a combination of the factors listed above at specific systems might impact the technical achievability of the model PNF. EPA found that the combination of factors at mills that achieve the model PNF is comparable to the combination of factors at mills that do not achieve the model PNF.

Finally, EPA considered whether any of the mills whose wastewater treatment performance data EPA used to develop the model LTAs achieve the model PNF. The two BAT treatment technology sites operate a total of six continuous caster systems, four of which achieve the model PNF. Of the remaining two continuous casters, one does not operate a high-rate recycle system, and one operates a high-rate recycle system, but at a recycle rate less than 97.4 percent.

13.6 Subpart D: Integrated and Stand-Alone Hot Forming Subcategory[1]

Fifty-seven integrated and stand-alone sites indicated in their industry survey responses that they conducted hot forming operations; EPA identified 71 hot forming operations at integrated and stand-alone mills that were active in 1997. The Agency was unable to analyze data from three processes due to incomplete industry survey responses.

The Agency identified spray water, used for cooling and descaling of the steel during the hot forming process, as the primary wastewater source. For this subcategory, EPA uses spray water as a generic term because there are many different sources of spray water within a hot forming mill. Spray water includes the following: high-pressure descaling sprays, roll and/or roll table spray cooling, die spray cooling, scarfer emissions control, hot shear spray cooling, flume flushing, low-pressure/laminar flow cooling, and product cooling on runout tables. Other sources of wastewater included in the development of the model PNFs were roll shop wastewater, wastewater collected in basement sumps, scarfer water, and equipment cleaning water.

The Agency did not include non-process wastewater sources in determining the model PNF, as discussed in Section 13.1. Non-process wastewater from hot forming operations

[1]EPA did not perform a reanalysis of the model PNFs for this subcategory for the final rule, because it would not affect the Agency's final decision. This discussion reflects the analyses from proposal.

that is often treated with process wastewater includes noncontact cooling water from reheat furnaces.

During the analysis, the Agency determined that 12 of the 57 sites operate combined wastewater treatment and/or recycle systems for their hot forming operations. To calculate the site-specific PNF for a particular manufacturing operation that shares a combined treatment and/or recycle system with one or more other manufacturing operations, EPA prorated the total system wastewater discharge flow by the percentage of the total treatment and/or recycle system influent wastewater flow from that process.

EPA selected the model flow rate based on wastewater treatment systems operating with 96 percent recycle. The Agency determined that systems operating with this level of recycle were the best performing mills in the subcategory. EPA selected 100 gpt as the model PNF for integrated and stand-alone hot forming. Twenty-one of the 68 operations reported PNFs less than or equal to 100 gpt, including 7 operations that reported zero discharge. All of the operations currently meeting the model PNF operate high-rate recycle systems with recycle rates of at least 95 percent. The mills used to develop the model flow rate are representative of integrated and stand-alone hot forming mills across the industry: they generate wastewater from a variety of sources, including contact water, rolls shops, and basement sumps; they hot form a range of products (e.g., strip, plate, pipe, tube, bar); and they are located in different geographic locations. For those operations with recycle systems that are not achieving the model flow rate, the Agency included sufficient costs to upgrade all of the systems to achieve this rate. For those operations with once-through treatment systems, the Agency included sufficient costs to install and operate high-rate recycle systems that could achieve the model flow rate.

The Agency did not select zero discharge as the model PNF for integrated and stand-alone hot forming sites due to the costs. The Agency determined that the capital costs involved with retrofitting existing recycle systems to operate at a 100-percent recycle rate would be cost-prohibitive.

13.7 <u>Subpart E: Non-Integrated Steelmaking and Hot Forming Subcategory</u>

The proposed non-integrated steelmaking and hot forming subcategory includes the following manufacturing operations conducted at non-integrated steel mills: electric arc furnace (EAF) steelmaking, ladle metallurgy, vacuum degassing, continuous casting, and hot forming. EPA evaluated wastewater discharge flow rates separately for each process operation as described in the following subsections. The results of this evaluation are summarized here, and detailed support documentation is located in the Iron and Steel Administrative Record (Section 14.1, DCN IS10357 and Section 14.1, DCN IS10824 in the rulemaking record). EPA proposed two segments within this subcategory, carbon and alloy steel and stainless steel, because of differences in pollutants present in the wastewaters. EPA did not find discernable differences in water use, wastewater sources, and wastewater discharge flow rates between the segments; therefore, this discussion of the development of model PNFs does not distinguish between the two segments.

Note that for the final rule, EPA decided to retain the subcategorization structure and limitations and standards from the 1982 rule, which includes separate subcategories for steelmaking, vacuum degassing, and continuous casting. This section describes the model PNFs that EPA developed for technology options considered for the final rule, but ultimately rejected.

Approximately one-third of non-integrated sites operate combined wastewater treatment and/or recycle systems for vacuum degassing, continuous casting, and/or hot forming operations. Non-integrated mills commonly cotreat these process wastewaters. The common characteristics of the process wastewater from each operation allow the sites to commingle and treat the wastewater. To calculate the site-specific PNF for a particular manufacturing operation that shares a combined treatment and/or recycle system with one or more other manufacturing operations, EPA prorated the total system wastewater discharge flow by the percentage of the total treatment and/or recycle system influent wastewater flow from that process.

13.7.1 Electric Arc Furnace (EAF) Steelmaking

The Agency evaluated data from 69 facilities that indicated in their industry survey response that they perform non-integrated steelmaking. The analysis included a total of 76 EAF shops and 132 EAFs. All EAFs in the United States are equipped with dry or semi-wet air pollution controls, and none discharge process wastewater. (One EAF shop has a wet scrubber system that functions as a backup.) Based on this evaluation, EPA has designated EAF steelmaking as a zero discharge operation.

13.7.2 Ladle Metallurgy

None of the sites that use ladle metallurgy reported generating or discharging process wastewater from this operation; therefore, EPA has designated ladle metallurgy as a zero discharge operation.

13.7.3 Vacuum Degassing

EPA analyzed industry survey responses for 29 non-integrated vacuum degassing systems to develop the model PNF that EPA considered for the final rule. Available data were insufficient to calculate PNFs for three of these systems. Blowdown from the vacuum generating system was the only reported source of process wastewater.

EPA first ordered the vacuum degassing systems by PNF and assessed the distribution. Review of the distribution suggested model PNFs of approximately 0, 4 and 23 gpt. These correspond to recycle rates of approximately 100 percent, 99.5 percent or greater, and 99.0 percent or greater, respectively. EPA rejected potential model PNFs of 0 and 4 gpt because of substantial costs needed to achieve these performance levels and concerns regarding technical achievability by all facilities. However, a model PNF of 23 gpt does not represent the performance demonstrated by mills since the 1982 regulation. Therefore, EPA initially considered 10 gpt as the model PNF for three reasons. First, the performance level is representative of well-operated, high-rate recycle systems in this segment. Second, the performance level represents a significantly lower discharge flow rate than that demonstrated in 1982. Third, the PNF is widely demonstrated and achievable, as evidenced by the fact that 13 of the 26 systems, or 50 percent, achieve the performance level.

Next, EPA assessed whether the model PNF of 10 gpt is technically achievable. Process water recycle systems at non-integrated mills are typically operated by mill personnel, and the chemistry within the systems is most often managed by chemical suppliers on a contract basis. Based on review of survey information and follow-up contacts with environmental control personnel and their chemical suppliers, EPA concluded that process water recycle system flows are often managed at levels below maximum design capacity. In other words, mills in this circumstance have some available hydraulic capacity to pump and cool more water through the systems than they currently process. Additionally, at many mills, the chemical suppliers determine blowdown rates and recycle system chemistry, with the proviso that they have to stay within permit limits. Current NPDES permits issued under the 1982 regulation do not require optimizing recycle systems and minimizing blowdown rates to the level of the model PNFs considered for the final rule. Although the PNFs discussed in this section are well demonstrated for all operations in this subcategory, many mills do not achieve the PNFs and have had no incentive to do so.

EPA also assessed the following specific factors to determine whether any suggested that a model PNF of 10 gpt is not technically achievable.

Process - EPA compared the type of vacuum degasser system used (i.e., argon stirring, ladle, tank, stream, vacuum arc remelt, ladle refining, vacuum induction, recirculation, Ruhrstahl-Heraeus) to performance. All process types, with the exception of stream, are demonstrated to achieve the model PNF. The performance levels achieved by the two stream systems are 19 and 32 gpt, respectively. The recycle rate achieved by one of the stream systems is unknown, and the recycle rate achieved by the second stream system is 98.9 percent. Currently, this system is not operating at capacity. An increase in recycle rate to 99.4 percent or greater would allow the system to achieve the model PNF. EPA is not aware of any technical reasons why stream systems would not be able to achieve the model PNF, and EPA has not received any comments suggesting that the type of vacuum degasser system used affects the technical achievability of the model PNF.

Age of equipment and facilities involved - EPA compared the first year of operation of vacuum degassing systems to the PNFs. Systems that achieve the model PNF include both the oldest and the newest systems. Thus, age is not considered a significant factor for selecting a PNF for vacuum degassing operations at non-integrated mills.

Location - EPA compared geographical location to performance. Systems that achieve the model PNF are located in a variety of areas, including arid and semi-arid regions and northern and southern regions.

Size - EPA compared vacuum degasser production to performance. Sites achieving the model PNF of 10 gpt include both the largest and smallest sites.

Non-water quality environmental impacts, including energy - Non-water quality environmental impacts related to high-rate recycle systems are not a significant consideration for vacuum degassing. Any impacts have already occurred because most non-integrated vacuum degassing operations either have high-rate recycle systems or discharge to high-rate recycle systems in other processes (e.g., casting or hot forming). The incremental non-water quality environmental impacts and energy consumption associated with achieving the model PNF are minimal.

Next, EPA evaluated whether a combination of the factors listed above at specific systems might impact the technical achievability of the model PNF. EPA found that the combination of factors at mills that achieve the model PNF is comparable to the combination of factors at mills that do not achieve the model PNF.

Finally, EPA considered whether any of the sites whose wastewater treatment performance data EPA used to develop the model LTAs achieve the model PNF. None of the four BAT treatment technology sites operates vacuum degassers; however, EPA concludes that the model LTAs are technically achievable for all sites in this subcategory for the reasons discussed in the Agency's reassessment of the model LTAs for the final rule (Section 14 and elsewhere in the rulemaking record).

13.7.4 Continuous Casting

EPA analyzed industry survey responses for 76 non-integrated continuous casting systems to develop the model PNF that EPA considered for the final rule. Available data were insufficient to calculate PNFs for two additional systems. In its PNF analysis, EPA included reported discharge flow rates for process wastewaters, including contact spray cooling and equipment cleaning wastewaters. EPA did not include non-process wastewater sources, such as low-volume losses from closed caster mold and machine cooling water systems, for the reasons discussed in Section 13.1.

EPA first ordered the continuous casting systems by PNF and assessed the distribution. Review of the distribution suggested model PNFs of 0, 4, 11, and 18 gpt. These correspond to recycle rates of approximately 100 percent, 99.6 percent and greater, 99.3 percent and greater, and 98.9 percent and greater, respectively. EPA rejected PNFs of 0 and 4 gpt because of substantial costs needed to achieve this performance level and concerns regarding technical achievability by all facilities. EPA also rejected a PNF of 18 gpt because it does not represent the demonstrated performance commonly achieved by mills. Therefore, EPA initially considered 11 gpt as the model PNF for three reasons. First, the performance is representative of well-operated, high-rate recycle systems in this segment. Second, the performance level represents a significantly lower flow rate for casters than that considered in 1982. Finally, a significant portion of the continuous casting systems, 32 of the 76 systems or 42 percent, currently achieve the performance level, suggesting it is widely demonstrated and achievable.

Next, EPA assessed whether the model PNF of 11 gpt is technically achievable. Process water recycle systems at non-integrated mills are typically operated by mill personnel, and the chemistry within the systems is most often managed by chemical suppliers on a contract basis. Based on review of survey information and follow-up contacts with environmental control personnel and their chemical suppliers, EPA concluded that process water recycle system flows are often managed at levels below maximum design capacity. In other words, mills in this circumstance have some available hydraulic capacity to pump and cool more water through the systems than they currently process. Additionally, at many mills, the chemical suppliers determine blowdown rates and recycle system chemistry, with the proviso that they have to stay within permit limits. Current NPDES permits issued under the 1982 regulation do not require optimizing recycle systems and minimizing blowdown rates to the level of the model PNFs considered for the final rule. Although the PNFs discussed in this section are well demonstrated for all operations in this subcategory, many mills do not achieve the PNFs and have had no incentive to do so.

Next, EPA assessed the following specific factors to determine whether any suggested that a model PNF of 11 gpt is not technically achievable.

Product Cast - EPA compared the type of product cast (i.e., billet, bloom, slab, thin slab, other, various) to performance. All process types are demonstrated to achieve the model PNF as summarized below.

Product Cast	Percentage of Facilities Achieving Model PNF
Billet	42%
Bloom	29%
Slab	50%
Thin Slab	40%
Other	50%
Various	43%

Although a significant percentage of thin slab producers currently achieve the model PNF, EPA created a separate segment for thin slab products. This decision was based on industry product trends toward thinner products that may need higher PNFs and is described in detail in Section 13.7.6.

Age of equipment and facilities involved - EPA compared the first year of operation of continuous casting systems to the PNFs. Systems that achieve the model PNF include both the oldest and the newest systems. Thus, age is not considered a significant factor for selecting a PNF for continuous casting operations at non-integrated mills.

Location - EPA compared system geographical location to performance. Systems that achieve the model PNF are located in a variety of areas, including arid and semi-arid regions and northern and southern regions.

Size - EPA compared continuous caster production to performance. Sites achieving the model PNF of 11 gpt include both the largest and smallest sites.

Non-water quality environmental impacts, including energy - Non-water quality environmental impacts related to high-rate recycle systems are not a significant consideration for continuous casting. Any impacts have already occurred because most non-integrated continuous casters either have high-rate recycle systems or discharge to high-rate recycle systems in other processes (e.g., vacuum degassing or hot forming). The incremental non-water quality environmental impacts and energy consumption associated with achieving the model PNF are minimal.

Next, EPA evaluated whether a combination of the factors listed above at specific systems might impact the technical achievability of the model PNF. EPA found that the combination of factors at mills that achieve the model PNF is comparable to the combination of factors at mills that do not achieve the model PNF.

Finally, EPA considered whether any of the mills whose wastewater treatment performance data EPA used to develop the model LTAs achieve the model PNF. The three BAT treatment technology sites operate a total of four continuous caster systems, three of which are thin slab casting systems. The one conventional continuous caster system does not achieve the model PNF. This system operates a high-rate recycle system, but at a recycle rate of less than 99.3 percent. Both of the BAT sites operating thin slab casters achieve the combined continuous casting and hot forming model PNF considered for that segment of the industry.

13.7.5 Hot Forming

EPA analyzed industry survey responses for 98 non-integrated hot forming mills to develop the model PNF that EPA considered for the final rule. Available data from four other mills were insufficient to calculate PNFs. In its PNF analysis, EPA included reported discharge flow rates for process wastewaters, including contact spray cooling, scarfer emissions control, flume flushing, blowdown from roll shop wastewater, wastewater collected in basement sumps, scarfer water, and equipment cleaning and wash-down water. EPA did not include non-process wastewater sources, such as noncontact cooling water from reheat furnaces, which is sometimes included in the process water recycle loop or recycled separately with a blowdown to the process water loop, for the reasons discussed in Section 13.1.

EPA first ordered the hot forming mills by PNF and assessed the distribution. Review of the distribution showed a smooth progression of PNFs up to 285 gpt with no clear indicator of "best" performance. EPA rejected PNFs less than 50 gpt because of substantial costs required to achieve this performance level and concerns regarding technical achievability by all facilities. EPA initially considered 50 gpt as the model PNF, which corresponds to a general recycle rate of approximately 99 percent. EPA considers this performance to be representative of well-operated, high-rate recycle systems in this segment. The performance level also represents a significantly lower flow than those used to develop the 1982 rule, which is based on partial rather than high-rate recycle. Finally, a significant portion of the hot forming mills, 47 of the 98 mills or 48 percent, currently achieve the performance level, suggesting it is widely demonstrated and achievable.

Next, EPA assessed whether the model PNF of 50 gpt is technically achievable. Process water recycle systems at non-integrated mills are typically operated by mill personnel, and the chemistry within the systems is most often managed by chemical suppliers on a contract basis. Based on review of survey information and follow-up contacts with environmental control personnel and their chemical suppliers, EPA concluded that process water recycle system flows are often managed at levels below maximum design capacity. In other words, mills in this circumstance have some available hydraulic capacity to pump and cool more water through the systems than they currently process. Additionally, at many mills, the chemical suppliers determine blowdown rates and recycle system chemistry, with the proviso that they have to stay within permit limits. Current NPDES permits issued under the 1982 regulation do not require optimizing recycle systems and minimizing blowdown rates to the level of the model PNFs considered for the final rule. Although the PNFs discussed in this section are well demonstrated for all operations in this subcategory, many mills do not achieve the PNFs and have had no incentive to do so.

Next, EPA assessed the following specific factors to determine whether any suggested that a model PNF of 50 gpt is not technically achievable.

Product Formed - EPA compared the type of mill (i.e., primary, section, flat, and pipe and tube) to performance. All process types, with the exception of pipe and tube mills, are demonstrated to achieve the model PNF as summarized below.

Mill Type	Percentage of Facilities Achieving Model PNF
Primary	25%
Section	60%
Flat	30%
Pipe and Tube	0%

Four sites operate a total of seven pipe and tube mills with PNFs ranging from 77 to 22,319 gpt. Four of these mills (at two sites) operate recycle systems. One mill operates a recycle system with no treatment at a recycle rate of 92 percent and achieves a PNF of 77 gpt. The other three mills recycle from the same treatment system at a rate of 94.9 percent and achieve PNFs of 281, 590 and 730 gpt. Treatment consists of a clarifier, cooling tower, sludge dewatering, scale pit, and filter for the recycle system achieving 94.9 percent.

The overall lack of high-rate recycle and treatment systems at pipe and tube mills, and their relatively high PNFs, suggest that the existing performance at these mills is uniformly inadequate. EPA is not aware of any technical reasons why these mills would not be able to achieve the model PNF. Although comments submitted in response to the proposed rule indirectly suggest that the type of hot forming mill affects the resulting PNF, they provide no technical basis for their contention that pipe and tube mills require a higher PNF (e.g., product quality, process considerations). Therefore, EPA believes that pipe and tube mills can achieve the model PNF.

Although a significant percentage of thin slab producers currently achieve the model PNF, EPA created a separate segment for thin slab products. This decision was based on industry product trends toward thinner products that may require higher PNFs and is described in detail in Section 13.7.6.

Age of equipment and facilities involved - EPA compared the first year of operation of hot forming mills to PNFs. Systems that achieve the model PNF include both the oldest and the newest systems. Thus, age is not considered a significant factor for selecting a PNF for hot forming operations at non-integrated mills.

Location - EPA compared mill geographical location to performance. Systems that achieve the model PNF are located in a variety of areas, including arid and semi-arid regions and northern and southern regions.

Size - EPA compared hot forming mill production to performance. Sites achieving the model PNF of 50 gpt include both the largest and smallest sites.

Non-water quality environmental impacts, including energy - Non-water quality environmental impacts related to high-rate recycle systems are not a significant consideration for hot forming. Any impacts have already occurred because most non-integrated hot forming mills either have high-rate recycle systems or discharge to high-rate recycle systems in other processes (e.g., vacuum degassing or casting). The incremental non-water quality environmental impacts and energy consumption associated with achieving the model PNF are minimal.

Next, EPA evaluated whether a combination of the factors listed above at specific mills might impact the technical achievability of the model PNF. EPA found that the combination of factors at mills that achieve the model PNF is comparable to the combination of factors at mills that do not achieve the model PNF.

Finally, EPA considered whether any of the mills whose wastewater treatment performance data EPA used to develop the model LTAs achieve the model PNF. The three BAT treatment technology sites operate a total of three hot forming mills, two of which are operated in combination with thin slab casters. The one hot forming mill not associated with a thin slab caster does not achieve the model PNF. This site operates a recycle system, but it is operated at a rate below 99 percent. Additionally, one hot forming mill with treatment beyond BAT achieves a PNF of 14 gpt. Both of the BAT sites operating thin slab casters achieve the combined continuous casting and hot forming model PNF considered for that segment of the industry.

13.7.6 Combined Thin Slab Casting and Hot Forming

This section discusses EPA's rationale for considering a separate industry segment for thin slab producers for the final rule. For this new segment, EPA developed a combined thin slab casting and hot forming model PNF for use in its analyses for the final rule.

The principal difference between conventional slab casting and thin slab casting is that the cast product is typically 2 inches thick rather than 8 to 10 inches thick. This allows for an abbreviated hot forming process to produce flat-rolled sheet. Conventional hot strip mills operated by steel producers include: reheat furnaces where cast slabs are heated most often from ambient temperature (i.e., cold) to rolling temperature; scale breakers; a series of roughing stands; a series of finishing stands; a laminar flow strip cooling section; and strip coilers. With thin slab casting, the hot rolling process includes a tunnel furnace where slab temperature is normalized to rolling temperature, one or more intermediate rolling stands, a series of finishing stands, a laminar flow strip cooling section, and strip coilers. The savings in investment cost, land requirements, energy requirements and labor are considerable with thin slab casting.

Most thin slab producers have combined treatment and recycle systems for caster spray water and hot strip mill contact water systems. The volume of applied flows and recycle system flows for these facilities is considerably higher than for the remainder of the non-integrated segment, which is dominated by bar products. This is particularly true for the hot forming operations and results from the high volumes of water needed to operate the strip finishing stands and laminar flow strip cooling systems. The overall recycle rates for the thin slab caster are in the range of 96.9 percent to 99.8 percent, with most mills in the range of 98 percent. For the hot mills, the corresponding recycle rates are around 99 percent. For these reasons, EPA considered and evaluated for the final rule a combination thin slab casting and hot forming model PNF.

To develop the combination thin slab casting and hot forming model PNF, EPA analyzed industry survey responses from eight thin slab producers, which include seven non-integrated mills and one integrated mill. EPA calculated site-specific combined thin slab casting and hot forming PNFs using process water blowdown rates from each of the thin slab caster and hot forming mill complexes. These Agency normalized blowdown rates to the combination of the tons of steel cast and processed in the hot strip mill, which is essentially twice the amount of steel cast. Some mills report differences in casting and hot forming production that ostensibly account for yield losses in the hot strip mill, while others report the same production for both units. Next, EPA ordered the mills by the combined PNF and assessed the distribution. Review of the distribution showed a smooth progression of PNFs ranging from 0 to 522 gpt with no clear indicator of "best" performance. EPA rejected potential model PNFs less than 120 gpt because of substantial costs needed to achieve this performance level and concerns regarding technical achievability by all facilities, particularly considering industry product trends toward thinner products that may require higher PNFs. Therefore, EPA initially considered 120 gpt as the model PNF for three reasons. First, the performance is representative of well-operated, high-rate recycle systems in this segment. Second, the performance level represents a significantly lower flow for continuous casting and hot forming than that considered in 1982. Finally, a significant portion of the thin slab producers, five of the eight mills or 63 percent, currently achieve the performance level, suggesting it is widely demonstrated and achievable.

Next, EPA assessed whether the model PNF of 120 gpt is technically achievable. Process water recycle systems at non-integrated and integrated mills are typically operated by mill personnel, and the chemistry within the systems is most often managed by chemical suppliers on a contract basis. Based on review of survey information and follow-up contacts with environmental control personnel and their chemical suppliers, EPA concluded that process water recycle system flows are often managed at levels below maximum design capacity. In other words, mills in this circumstance have some available hydraulic capacity to pump and cool more water through the systems than they currently process. Additionally, at many mills, the chemical suppliers determine blowdown rates and recycle system chemistry, with the proviso that they have to stay within permit limits. Current NPDES permits issued under the 1982 regulation do not require optimizing recycle systems and minimizing blowdown rates to the level of the model PNFs considered for the final rule. Although the PNFs discussed in this section are well demonstrated for all operations in this subcategory, many mills do not achieve the PNFs and have had no incentive to do so.

Next, EPA assessed the following specific factors to determine whether any suggested that a model PNF of 120 gpt is not technically achievable.

Product Cast - All eight mills produce thin slab products, and five of these mills currently achieve the model PNF.

Age of equipment and facilities involved - All eight of the thin slab producers began production within a relatively short period of time between 1989 and 1997; therefore, the range of ages is not significant.

Location - EPA compared system geographical location to performance. Systems that achieve the model PNF are located in a variety of areas, including arid and semi-arid regions and northern and southern regions.

Size - EPA compared both continuous caster and hot forming production to performance. Sites achieving the model PNF of 120 gpt include both the largest and smallest sites.

Non-water quality environmental impacts, including energy - Non-water quality environmental impacts related to high-rate recycle systems are not a significant consideration for continuous casting. Any impacts have already occurred because the thin slab producers currently operate high-rate recycle systems. The incremental non-water quality environmental impacts and energy consumption associated with achieving the model PNF are minimal.

Next, EPA evaluated whether a combination of the factors listed above at specific systems might impact the technical achievability of the model PNF. EPA found that the combination of factors at mills that achieve the model PNF is comparable to the combination of factors at mills that do not achieve the model PNF.

Finally, EPA considered whether any of the mills whose wastewater treatment performance data EPA used to develop the model LTAs achieve the model PNF. Two of the three BAT treatment technology sites produce thin slab products, and both sites achieve the model PNF.

13.8 Subpart F: Steel Finishing Subcategory[2]

The Agency established the carbon and alloy steel and stainless steel segments for the steel finishing subcategory because of differences in pollutants present in the wastewater. EPA also identified several manufacturing process divisions between the segments. Below are separate discussions for acid pickling, cold forming, alkaline cleaning, stand-alone continuous annealing, hot coating, and electroplating.

13.8.1 Acid Pickling

The Agency analyzed data from the 61 sites (integrated, non-integrated, and stand-alone) that indicated in their industry survey responses that they performed acid pickling. Because some plants operate more than one acid pickling line, the number of process lines analyzed was 130. The Agency was unable to analyze data from three lines due to incomplete industry survey responses.

For the regulatory alternatives considered by EPA for the final rule, EPA defined acid pickling lines to include alkaline cleaning and salt bath and electrolytic sodium sulfate (ESS) descaling operations that occur on the line that includes acid pickling. In a small number of instances, continuous annealing operations with an associated water quench take place on acid pickling lines. In these instances, EPA included discharge from the annealing rinse as a wastewater source from acid pickling lines. The Agency also evaluated acid regeneration operations to determine the volume of wastewater generated and discharged during these operations.

During the analysis, the Agency identified three major sources of wastewater from acid pickling lines. The first is rinse water used to clean the acid solution from the steel. Rinse water comprises the largest volume of wastewater from acid pickling lines to wastewater treatment operations. The second is spent pickle liquor, a solution composed primarily of acid that is no longer an effective pickling agent. The third major source of wastewater is generated by the WAPC devices located above the pickling tanks. Other minor sources of wastewater included in the development of model PNFs were process wastewater from other operations (e.g., salt bath descaling) on the acid pickling lines (spent process baths and rinses); raw material handling, preparation, and storage; tank clean-outs; and equipment cleaning water. Except for

[2]EPA did not perform a reanalysis of the model PNFs for this subcategory for the final rule, because it would not affect the Agency's final decision. This discussion reflects the analyses from proposal.

blowdown from surface cleaning tanks, these wastewater sources are noncontinuous sources of wastewater that minimally contribute to the total wastewater flow.

When responding to the industry survey, sites had the option of indicating several different discharge destinations for process wastewater. These destinations included the following: on-site regeneration and reuse, discharge to another process or rinse, discharge to treatment, discharge without treatment to publicly owned treatment works (POTWs), discharge to privately owned treatment works (PrOTWs), recycle and reuse, and several zero discharge methods including contract hauling. If a discharge was listed as recycle and reuse, discharge to another process or rinse, or zero discharge or alternative disposal method, such as contract hauling, EPA did not use the discharge in developing the model PNF. Several sites often responded that discharges were split between discharge to treatment and zero discharge methods of disposal such as contract hauling, but did not provide the portion of flow going to each. In these cases, EPA accounted for all of the flow in model PNF development.

The Agency analyzed data from 219 WAPC devices (fume scrubbers) that were reported as being operated on acid pickling lines. After reviewing the 1997 industry survey data and comparing it to the data used to develop the 1982 rule, the Agency determined that the model flow rate of 15 gpm in the 1982 rule is still applicable.

The following tables list the model PNFs for carbon and alloy and stainless steel pickling operations. The Agency did not identify any sites that performed plate pickling operations on carbon and alloy steels. Consequently, the Agency transferred the model plate pickling flow rate from the Stainless Steel Segment to the carbon and alloy steel hydrochloric and sulfuric acid plate pickling manufacturing operations. Similarly, the Agency did not identify any sites that performed pipe and tube pickling operations on stainless steels, and, transferred the model specialty steel pipe and tube flow rate from the 1982 development document.

Carbon and Alloy Steel Hydrochloric Acid Pickling Model Flow Rates

Carbon and Alloy Hydrochloric Acid Pickling	Model PNF (gpt)	Operations Currently Operating at or Below the Model PNF	Number of Operations Analyzed
Strip, sheet	50	18	48
Bar, billet, rod, coil	490 (a)	1	1
Pipe, tube	1,020 (a)	2	3
Plate	35 (b)	N/A	0
Fume scrubber (gal/min)	15 (a)	8	14

(a) Value transferred from the 1982 development document.
(b) Value transferred from Stainless Steel Segment.

Carbon and Alloy Steel Sulfuric Acid Pickling Model Flow Rates

Carbon and Alloy Sulfuric Acid Pickling	Model PNF (gpt)	Operations Currently Operating at or Below the Model PNF	Number of Operations Analyzed
Strip, sheet	230	4	10
Bar, billet, rod, coil	280 (a)	2	7
Pipe, tube	500 (a)	1	1
Plate	35 (b)	N/A	0
Fume scrubber (gal/min)	15 (a)	34	60

(a) Value transferred from the 1982 development document.
(b) Value transferred from Stainless Steel Segment.

Stainless Steel Acid Pickling Model Flow Rates

Stainless Steel Acid Pickling	Model PNF (gpt)	Operations Currently Operating at or Below the Model PNF	Number of Operations Analyzed
Strip, sheet	700	19	50
Bar, billet, rod, coil	230 (a)	1	2
Pipe, tube	770 (a)	0	0
Plate	35	3	3
Fume scrubber (gal/min)	15 (a)	36	54

(a) Value transferred from 1982 development document.

EPA selected a model flow rate of 50 gpt for hydrochloric acid pickling of strip or sheet because 18 of the 48 process lines were demonstrating this model flow rate. The Agency selected a model flow rate below the median value of 79 gpt for hydrochloric acid pickling of strip and sheet, because the better performing mills are achieving this discharge rate. EPA selected 230 gpt as the model flow rate for sulfuric acid pickling of strip and sheet instead of the median PNF of 265 gpt. The Agency concluded that the selected flow rate roughly approximating, but slightly lower than, the median PNF is well demonstrated and achievable for all operations in the segment. The remaining model flow rates for hydrochloric acid pickling and sulfuric acid pickling were either transferred from the 1982 development document or from the Stainless Steel Segment (pickling).

EPA selected 700 gpt as the model flow rate for stainless steel acid pickling of strip and sheet instead of the median PNF of 874 gpt. The Agency considers the sites achieving the model flow rate (38 percent of the total) to be the better performing operations in this segment. EPA selected 35 gpt for stainless steel acid pickling of plate instead of the median of 33 gpt. Each of the sites that pickles plate was already achieving this flow rate and the Agency determined that it would be cost-prohibitive to reduce the flow rate further. EPA transferred the remaining model flow rates for stainless steel acid pickling from the 1982 development document.

The Agency identified six zero discharge acid pickling lines during its analysis of the acid pickling subcategory. The Agency did not select zero discharge as the model flow for any of the acid pickling operations because sites would have to use options such as contract hauling of waste to achieve zero discharge. In addition, the Agency concluded that it was not feasible to achieve zero discharge on an industry-wide basis.

The Agency analyzed data from WAPC devices (e.g., absorber vent scrubbers) that acid regeneration operations reported operating. After reviewing the 1997 industry survey data and comparing it to the data used for the 1982 regulation, the Agency determined that the model flow rate of 100 gpm contained in the 1982 rule is still applicable.

13.8.2 Cold Forming

The Agency considered data from the 64 sites (integrated, non-integrated, stand-alone) that reported performing cold forming in their industry survey responses. Because some plants operate more than one cold forming operation, the total number of operations analyzed was 234. The Agency was unable to analyze data from two operations due to incomplete industry survey responses.

During the analysis, the Agency identified blowdown from the contact water and rolling solution systems as the primary source of wastewater. For the purposes of this manufacturing operation, the Agency made no distinction between contact spray water systems and rolling solution systems, which can include blowdown from roll and/or roll table spray cooling and product cooling. Other sources of wastewater included in the development of model PNFs were equipment cleaning water, wastewater from roll shops, and basement sumps.

The following table presents the selected model PNF, number of operations currently operating at the model PNF, and number of lines analyzed for carbon and alloy cold forming operations. Each of the selected model flow rates for carbon and alloy cold forming, except for single stand, recirculation, is slightly above the median PNF for each operation. EPA determined that it would be cost-prohibitive for all sites to achieve the median flow rate. For single stand, recirculation, EPA selected a flow rate below the median of 7 gpt. The Agency concluded that it was appropriate for single stand, recirculation, to have a lower flow rate than single stand, direct application. Therefore, EPA selected the model flow rate based on the three best performing mills in the category. The Agency did not select zero discharge as the model PNF for carbon and alloy cold forming operations because sites with a discharge from their recycle system(s) achieved zero discharge through either contract hauling or discharge to another process. The Agency concluded that contract hauling of waste is a not a universally applicable wastewater management approach and also recognizes that discharge to another process is not a viable option at all sites.

Carbon and Alloy Steel Cold Forming Model Flow Rates

Carbon and Alloy Cold Forming	Model PNF (gpt)	Operations Currently Operating at the Model PNF	Number of Operations Analyzed
Single stand, recirculation	1	3	18
Single stand, direct application	3	15	26
Multiple stand, recirculation	25	16	28
Multiple stand, direct application	275	11	19
Multiple stand, combination	143	5	8

The following table presents the selected model PNF, number of operations currently operating at the model PNF, and number of operations analyzed for stainless cold forming. The selected model flow rates for stainless cold forming are slightly above the median flow rates. EPA determined that it would be cost-prohibitive for all sites to achieve the median flow rate. The Agency did not select zero discharge as the model PNF for stainless steel cold forming operations for the reasons cited above. After reviewing the industry survey data, the Agency did not identify any sites operating multiple stand, direct application, or multiple stand, combination, rolling mills for stainless steels. The Agency transferred the model flow rates for these operations from the Carbon and Alloy Steel Segment, because of similarities in the manufacturing processes.

Stainless Steel Cold Forming Model Flow Rates

Stainless Steel Cold Forming	Model PNF (gpt)	Operations Currently Operating at the Model PNF	Number of Sites Reporting
Single stand, recirculation	3	7	13
Single stand, direct application	35	1	1
Multiple stand, recirculation	16	6	7
Multiple stand, direct application	275 (a)	N/A	0
Multiple stand, combination	143 (a)	N/A	0

(a) Value transferred from the Carbon and Alloy Steel Segment.
N/A = Not applicable.

13.8.3 Alkaline Cleaning

The Agency considered data from the 32 sites (integrated, non-integrated, and stand-alone) that indicated in their industry survey response that they performed alkaline cleaning operations on stand-alone process lines that do not have other processes such as pickling or coating. Because some plants operate more than one stand-alone alkaline cleaning operation, the total number of operations analyzed was 49. The Agency was unable to analyze data from one operation due to an incomplete survey response.

EPA has defined alkaline cleaning operations to include annealing operations on the same line; as a result, this segment includes both stand-alone alkaline cleaning lines and continuous annealing/alkaline cleaning lines. The Agency included annealing rinses, when present, in determining PNFs for the alkaline cleaning lines.

The primary sources of wastewater identified for alkaline cleaning operations were blowdown from the alkaline cleaning solution tanks and rinse water used to clean the alkaline cleaning solution from the steel. Other minor sources of wastewater included the following: rinse water from annealing operations (when operated with a water quench); runoff from raw material handling, preparation, and storage; tank clean-outs; and equipment cleaning and wash down water.

When developing the model PNF for alkaline cleaning, the Agency included all process wastewater flows that were conveyed to treatment. If a wastewater discharge was contract hauled or recycled and reused, the Agency did not include the flow in the development of the model PNF. If a site's industry survey response indicated that a flow was both contract hauled and discharged to treatment, but did not specify the portion of flow going to each, the Agency used the combined flow to develop the PNF. Each of the selected model flow rates for alkaline cleaning approximates the median flow rate.

EPA selected 320 gpt as the model PNF for alkaline cleaning of carbon and alloy steel strip and sheet. Twelve of the 24 lines reported PNFs of less than 320 gpt. None of these sites reported lines operating without a discharge.

EPA selected 20 gpt as the model PNF for alkaline cleaning of carbon and alloy steel pipe and tube. Four of the six sites reported lines with PNFs of less than or equal to 20 gpt. One site reported operating without a discharge by contract hauling its wastewater. The Agency did not select zero discharge as the model flow for alkaline cleaning of pipe and tube because sites would have to use disposal methods such as contract hauling to achieve zero discharge.

EPA selected 2,500 gpt as the model PNF for alkaline cleaning of stainless strip. Nine of the 15 sites reported lines with PNFs of less than or equal to 2,500 gpt. None of the sites reported operating without a discharge. The Agency did not identify any sites that practiced alkaline cleaning of stainless steel pipe and tube. EPA transferred the model pipe and tube flow rate of 20 gpt from the Carbon and Alloy Steel Segment.

13.8.4 Continuous Annealing

The Agency considered data from the 11 sites that indicated in their industry survey responses that they performed stand-alone continuous annealing operations (i.e., not on the same process line with operations such as alkaline cleaning or acid pickling). Because some sites operate more than one stand-alone continuous annealing operation, the total number of operations analyzed was 28. The Agency was unable to analyze data from two operations due to incomplete survey responses.

Stand-alone continuous annealing operations only include annealing operations that are not considered to be part of any other finishing line operated by the site. Annealing operations with a water quench that generate a discharge on acid pickling, cold forming, hot coating, alkaline cleaning, and electroplating lines are included in the model flow rate for these operations. Both the Carbon and Alloy Steel and Stainless Steel Segments have stand-alone continuous annealing operations that are divided into two categories: lines that do and lines that do not use water to quench the steel after the annealing process.

EPA selected 20 gpt (the median flow rate) as the model PNF for stand-alone continuous annealing with a water quench. Seven of the 14 lines with a water quench reported PNFs of less than or equal to 20 gpt. None of the sites reported operating without a discharge. Stand-alone continuous annealing lines that operate without a water quench do not generate process wastewater and have been designated as a zero-discharge operation.

13.8.5 Hot Coating

The Agency considered data from the 26 sites (integrated, non-integrated, and stand-alone) that indicated in their industry survey responses that they performed hot coating. Because some plants operate more than one hot coating line, the total number of lines analyzed was 40. The Agency was unable to analyze data from five lines due to incomplete survey responses. Hot coating operations are performed on carbon and alloy steels only. EPA has defined hot coating lines as including acid cleaning, annealing, alkaline cleaning, and other surface cleaning and preparation operations on the same line.

The primary source of wastewater from hot coating operations is the surface preparation operations, such as acid and alkaline cleaning, that the steel undergoes before hot coating. Four of the operations reported a discharge from their hot coating tanks. Thirty-two of the operations reported having a rinse following the coating operation. Tank clean-outs, fume scrubbers, and equipment cleaning are other sources of wastewater reported by a number of sites.

Wastewater Flow Rates

The Agency analyzed data from WAPC devices that were reported as being operated on hot coating lines. After reviewing the 1997 industry survey data and comparing it to the data used for the 1982 rule, the Agency determined that the model flow rate of 15 gpm contained in the 1982 rule is still applicable.

In developing the model PNF, the Agency only considered flow rates that were conveyed to treatment systems. When responding to the industry survey, sites had the option of indicating if they discharged process wastewater to treatment and/or disposed of it via several different zero discharge methods. If a site listed a zero discharge disposal method for a discharge, EPA did not use that discharge in the development of the model PNF. If a site's industry survey response indicated that a flow was both discharged to treatment and disposed of using a zero discharge method, but did not specify the portion of flow rate going to each, the Agency used the combined flow to develop the PNF.

EPA selected 550 gpt as the model PNF for hot coating operations. Twenty-eight of the 40 lines reported having PNFs of less than or equal to 550 gpt. Two of the lines reported operating without a discharge by using contract hauling. EPA determined that it would be cost-prohibitive for all sites to achieve the median PNF of 182 gpt. The Agency did not select zero discharge as the model flow for hot coating because sites would have to use disposal methods such as contract hauling to achieve zero discharge.

13.8.6 Electroplating

The Agency considered data from the 23 sites (integrated, non-integrated, and stand-alone) that indicated in their industry survey responses that they performed electroplating. Because some plants operate more than one electroplating line, the total number of operations analyzed was 44. The Agency was unable to analyze data from two operations due to incomplete survey responses. EPA has defined electroplating lines as annealing, alkaline cleaning, acid cleaning, and other surface cleaning and surface preparation operations on the same line.

The primary sources of wastewater from electroplating operations are acid and alkaline cleaning operations performed on the same process line, plating solution losses, and fume scrubbers. Tank clean-outs and equipment cleaning are other sources of wastewater reported by a number of sites.

The Agency analyzed data from WAPC devices that were reported as being operated on electroplating lines. After reviewing the 1997 industry survey data and comparing it to the data used for the 1982 regulation, the Agency determined that the model flow rate of 15 gpm contained in the 1982 effluent guidelines is still applicable.

In developing the model PNF, the Agency only considered flow rates that were conveyed to treatment systems. When responding to the industry survey, sites had the option of indicating whether they discharged their process wastewater to treatment and/or disposed of it via several different zero discharge disposal methods. If a site listed a zero discharge disposal method for discharge, EPA did not use that discharge in the development of the model PNF. If a site's industry survey response indicated that a flow was both discharged to treatment and disposed of using a zero discharge method, but did not specify the portion of flow going to each, the Agency used the combined flow to develop the PNF.

The model PNF for electroplating operations varies by the type of metal applied and the product type. The Agency chose a model PNF of 1,100 gpt for tin and chromium lines plating strip steel. Ten of the 20 lines reported PNFs equal to or less than 1,100 gpt. The Agency chose a model PNF of 550 gpt for lines plating strip steel with metals other than tin or chromium. Sixteen of the 20 lines reported PNFs equal to or less than 550 gpt. EPA determined that it would be cost-prohibitive for all sites to achieve the median PNF of 214 gpt. The Agency chose a model PNF of 35 gpt for electroplating of steel plate. Because the data for plate electroplating are confidential, they are not presented here. EPA concluded that the selected flow rates are achievable by well-operated electroplating operations.

13.9 Subpart G: Other Operations[3]

The subcategory the Agency proposes for other operations encompasses segments for direct-reduced ironmaking, forging, and briquetting.

13.9.1 Direct-Reduced Ironmaking (DRI) Segment

Three DRI plants provided industry survey data. One plant was operated at a non-integrated site and two were operated as stand-alone DRI sites. One plant began operations after 1997, but was considered for the development of the model flow rate. WAPC systems are the only reported process wastewater source for DRI operations. The WAPCs control furnace emissions and emissions from material handling and storage.

An evaluation of the three sites that conducted DRI operations found that they recycle scrubber wastewater. Based on the practice of wastewater recycle, the Agency selected a model PNF of 90 gpt; two of the three DRI plants are achieving this model flow rate.

13.9.2 Forging Segment

The Agency determined that forging operations are similar to other hot forming operations with respect to wastewater characteristics based on process considerations. Contact water and hydraulic system wastewater comprise most of the process wastewater from forging operations. Contact water is used for flume flushing, descaling, die spray cooling, and product quenching. Some sites identified equipment cleaning water and basements sumps as other sources of wastewater from forging operations.

EPA calculated PNFs for 15 forging operations based on available industry survey data. The Agency based its development of model treatment for forging operations on similar wastewater treatment for hot forming operations. As with hot forming, the Agency determined that wastewater treatment systems treating forging wastewaters demonstrate a recycle rate of 96 percent. High-rate recycle is a principle component of forging wastewater treatment and EPA used it to select a model flow rate. EPA selected a model PNF of 100 gpt for forging operations. This model flow rate is demonstrated at nine of the 15 forging operations that were analyzed.

13.9.3 Briquetting Segment

The Agency found that briquetting operations do not generate or discharge process wastewater. Therefore, the Agency has designated briquetting as a zero discharge operation.

[3]EPA did not perform a reanalysis of the model PNFs for this subcategory for the final rule, because it would not affect the Agency's final decision. This discussion reflects the analyses from proposal.

13.10 References

13-1 U.S. Environmental Protection Agency. Development Document for Effluent Guidelines and Standards for the Iron and Steel Manufacturing Point Source Category. Volume II. EPA 440/1-82/024, Washington, DC, May 1982.

13-2 U.S. Environmental Protection Agency. Development Document for Effluent Guidelines and Standards for the Iron and Steel Manufacturing Point Source Category. Volume I. EPA 440/1-82/024, Washington, DC, May 1982.

Table 13-1

Model PNF by Subcategory

Subcategory and Manufacturing Processes	Model PNF (gpt)
Cokemaking	
By-product recovery without biological control	113
By-product recovery with biological control	163
Non-recovery	0
Ironmaking	
Sintering with wet air pollution controls	75
Sintering with dry air pollution controls	0
Blast furnace ironmaking	25
Integrated Steelmaking	
Basic oxygen furnaces	
Semi-wet air pollution control	10
Wet-open air pollution control	86
Wet-suppressed air pollution control	22
Ladle metallurgy	0
Vacuum degassing	13
Continuous casting	25
Integrated and Stand-Alone Hot Forming	100
Non-Integrated Steelmaking and Hot Forming	
Electric arc furnaces	0
Ladle metallurgy	0
Vacuum degassing	10
Continuous casting	11
Hot forming	50
Combined thin slab casting and hot forming	120
Carbon and Alloy Hydrochloric Acid Pickling	
Strip, sheet	50
Bar, billet, rod, coil	490
Pipe, tube	1,020
Plate	35
Acid regeneration (gal/min)	100
Fume scrubber (gal/min)	15
Carbon and Alloy Sulfuric Acid Pickling	
Strip, sheet	230
Bar, billet, rod, coil	280
Pipe, tube	500
Plate	35
Fume scrubber (gal/min)	15

Table 13-1 (Continued)

Subcategory and Manufacturing Processes	Model PNF (gpt)
Stainless Steel Acid Pickling	
Strip, sheet	700
Bar, billet, rod, coil	230
Pipe, tube	770
Plate	35
Fume scrubber (gal/min)	15
Carbon and Alloy Cold Forming	
Single stand, recirculation	1
Single stand, direct application	3
Multiple stand, recirculation	25
Multiple stand, direct application	275
Multiple stand, combination	143
Stainless Steel Cold Forming	
Single stand, recirculation	3
Single stand, direct application	35
Multiple stand, recirculation	16
Multiple stand, direct application	275
Multiple stand, combination	143
Carbon and Alloy Alkaline Cleaning	
Strip, sheet	320
Pipe, tube	20
Stainless Steel Alkaline Cleaning	
Strip, sheet	2,500
Pipe, tube	20
Continuous Annealing	20
Hot Coating	
All types	550
Fume scrubber (gal/min)	15
Electroplating	
Tin/chrome - strip, sheet	1,100
Other metals - strip, sheet	550
Plate	35
Fume scrubber (gal/min)	15
Other Operations	
Direct-reduced ironmaking	90
Forging	100
Briquetting	0

SECTION 14

LIMITATIONS AND STANDARDS: DATA SELECTION AND CALCULATION

This section describes the data sources, data selection, data conventions, and statistical methodology used by EPA in calculating the long-term averages, variability factors, and limitations. The effluent limitations and standards[1] for cokemaking, sintering, and other operations subcategories and options are based on long-term average effluent values and variability factors that account for variation in treatment performance within a particular treatment technology over time.

Section 14.1 gives a brief overview of data sources (a more detailed discussion is provided in Section 3) and describes EPA's evaluation and selection of facility datasets that are the basis of the limitations. Section 14.2 provides a more detailed discussion of the selection of BAT facility datasets for cokemaking, sintering, and other operations subcategories and options. For those proposed subcategories that EPA decided not to revise, Sections 5.8 and 14.10 of the record contains descriptions of the development of long-term averages for pollutant removal analysis. Section 14.3 describes excluded and substituted data. Section 14.4 presents the procedures for data aggregation. Section 14.5 describes data editing criteria used to select episode datasets in calculating the long-term averages and limitations. Section 14.6 provides an overview of the limitations. Sections 14.7, 14.8, and 14.9 describe procedures for estimation of long-term averages, variability factors, and concentration-based limitations into the production-normalized limitations. Section 14.10 describes the procedures used to determine the concentration-based limitations for naphthalene for PSES. The attachments for Section 14 are provided in Appendix E.

14.1 Overview of Data Selection

To develop the long-term averages, variability factors, and limitations, EPA used wastewater data from facilities with components of the model technology for each subcategory and option. These data were collected from two sources, EPA's sampling episodes, herein referred to as "sampling episodes" and industry's self-monitoring data, herein referred to as "self-monitoring episodes." Because daily variability cannot be determined from summary data (e.g., monthly averages) as reported in the survey, EPA did not consider any facilities that provided only summary data. EPA qualitatively reviewed the data from the sampling and self-monitoring episodes and selected episodes to represent each option based on a review of the production processes and treatment technologies in place at each facility. EPA only used data from facilities that had some or all components of the model technologies for the option (model technologies for each option are described in Section 9).

Generally, if EPA selected data from a sampling episode, it also selected any self-monitoring episode data submitted from the same treatment system from the same facility. EPA's sampling episodes typically provided data for all of the regulated pollutants (see

[1]In the remainder of this chapter, references to 'limitations' includes 'standards.'

Section 12). In contrast, the industry self-monitoring data were only for a limited subset of pollutants (most facilities monitor only for pollutants specified in their permits). EPA analyzed the data from each episode separately in calculating the limitations. This is consistent with EPA's practice for other industrial categories. Data from different sources generally characterize different time periods and/or different chemical analytical methods. After proposal, EPA received comments questioning the validity of the above approach to keeping the episodes separate. For a more detailed discussion on the analysis EPA performed to address the comments, see Section 14.2.1 cokemaking discussion.

In developing the promulgated limitations, EPA generally used the self-monitoring data when they were measured by analytical methods specified in or approved under 40 CFR Part 136 that facilities are required to use for compliance monitoring. Section 4 describes all but one of the exceptions to this general rule. The remaining exception was EPA's exclusion of all industry self-monitoring data for oil and grease because facilities generally used methods which require freon, an ozone-depleting agent, as an extraction solvent. For the samples collected in its sampling episodes, EPA used a more recent method, Method 1664, which uses normal hexane (*n*-hexane) as the extraction solvent and measures oil and grease (O&G) as hexane extractable material (HEM). EPA developed the O&G limitations solely on the HEM measurements from Method 1664.

EPA received a number of comments on the ability of existing facilities to achieve both the long-term averages and the production-normalized flows (PNFs). The following paragraphs describe EPA's methodologies in selecting the BAT facilities and the datasets upon which the Agency based its long-term averages and its updated data editing procedures for long-term average and variability calculations. Section 14.2 provides more details about the BAT facility and dataset selection for each subcategory. For a discussion of PNFs, see Section 13 of this document.

First, EPA evaluated each dataset to determine what technology or series of technologies the data represented. In this manner, EPA eliminated many datasets because they did not represent a technology basis considered during development of this rule. In a few instances, EPA included data from facilities that employ technologies in addition to the technology bases being considered. In these cases, EPA had data from intermediate sampling points representing the model technologies; in other words, the data EPA employed reflected application of only the technologies under consideration. Next, EPA reviewed the remaining datasets to ensure that each facility was effectively operating its technologies. For example, EPA eliminated facilities that experienced repeated operating problems with their treatment systems or have discharge points located after addition of significant amounts (i.e., greater than 10 percent by volume) of non-process water.

For the datasets that remained, EPA performed a detailed review of the data and all supporting documentation accompanying the data. This includes both EPA sampling episodes and self-monitoring episodes. EPA performed this review to ensure that the selected data represent a treatment system's normal operating conditions and to ensure that the data accurately reflect the performance expected by the BAT treatment systems. Thus, EPA excluded data that were collected while a facility was experiencing exceptional incidents or upsets.

After determining the datasets to be included to calculate long-term averages and variability for each technology option under consideration for the final rule, EPA applied further data editing criteria on a pollutant-by-pollutant basis. For facilities where EPA possessed paired influent and effluent data, it performed a long-term average test. The test looks at the influent concentrations to ensure a pollutant is present at sufficient concentration to evaluate treatment effectiveness. If a pollutant failed the test (i.e., was not present at a treatable concentration), EPA excluded the data for that pollutant at that facility from its long-term average and variability calculations. In this manner, EPA would ensure that its limitations resulted from treatment and not simply the absence of that pollutant in the wastestream. See Section 14.5 for a detailed discussion and Appendix C for the results of the LTA test. In many cases, however, industry supplied EPA with effluent data, but not the corresponding influent data. In these cases, EPA used the effluent data without performing a long-term average test. EPA decided to use these data for two reasons. First, EPA wanted to include as much data as possible in its calculations. Second, the vast majority of pollutants for which industry supplied self-monitoring data are pollutants regulated in the existing iron and steel regulation; EPA has already established the presence of the regulated pollutants in treatable levels in iron and steel wastestreams. Therefore, EPA is confident that these effluent data represent effective treatment and not the absence of the pollutant in the wastestream.

Finally, EPA reviewed the remaining data on a pollutant-by-pollutant basis to determine if any data values appeared to be unreasonable and suitable for possible exclusions. These exclusions, along with justifications, are described in detail in the next section. Sections 5.8 and 14.10 of the record describes the data exclusions for those proposed subcategories that EPA decided not to revise.

14.2 Episode Selection for Each Subcategory and Option

This section describes the data selected for each pollutant for each technology option in each subcategory. See Section 9 for those options for which EPA is proposing no discharge of process wastewater pollutants to waters of the United States.

In the following sections and the public record, EPA has masked the identity of the episodes and sampling points to protect confidential business information (CBI). EPA sampling episodes are identified as ESExx and the industry self-monitoring episodes as ISMxx where “xx” is a unique two-digit number assigned to each episode (for example, ESE01 and ISM51). The sampling points are identified with SP-c where “c” is a character (for example, SP-A). The daily data and sampling points corresponding to these episodes are listed in Appendix C. Attachment 14-1 in Appendix E provides summary statistics for all episodes, sorted by subcategory and option.

14.2.1 Cokemaking Subcategory

For the by-product recovery segment in the cokemaking subcategory, as described in the following subsections, EPA is promulgating limitations based on BAT-1 and PSES-1. The data for the BAT-1 option were used to calculate the limitations for direct dischargers. (The technical components for BAT-1 are the same as those for PSES-3.) The data from the PSES-1 options were used to calculate the standards for indirect dischargers.

BAT-1 (PSES-3)

The BAT-1 option technology was used as the basis for the limitations for direct dischargers in the by-product recovery segment. EPA determined that all but two of the direct-discharging facilities with processes in the by-product recovery segment have the model technology associated with the BAT-1 option, namely ammonia stripping and biological treatment with nitrification and secondary clarification. Of these facilities, EPA selected data from three facilities that met the criteria described in Section 14.1. DCN IS10816 in section 14.10 of the record discusses the facility selection process for the by-product recovery cokemaking segment in detail. The selected data were from two sampling episodes (ESE01 and ESE02) and two self-monitoring episodes (ISM50 and ISM51). All the selected facilities treat wastewater from by-product recovery operations as well as small amounts of ground water or control water added for biological treatment optimization. One sampling episode and self-monitoring episode were from the same facility. EPA analyzed the data from each episode separately in calculating the limitations in order to be consistent with the Agency's traditional practice for other industrial categories and because the two episodes were associated with different analytical methods for some pollutants (e.g., naphthalene). Of the four episodes, EPA further reviewed the data and applied the following data exclusions:

- **ESE01 –** The facility's ammonia data were excluded completely because its influent concentrations during the five-day sampling event were abnormally and consistently low. EPA obtained more influent data from the plant and confirmed that the low levels of ammonia observed during the sampling event do not reflect the plant's normal raw wastewater characteristics. In addition, the facility's data for benzo(a)pyrene, O&G, and TSS were excluded due to LTA test (see Appendix C for test results).

- **ESE02 –** The facility's data for TSS were excluded due to LTA test.

- **ISM50** - EPA excluded the ammonia data for the time periods of 1/22/96-3/26/96 and 12/23/96-1/14/97 because these data values were unusually high. Furthermore, plant personnel confirmed that the biological system was down during the above two time periods because of nitrifier upset. In addition, the Agency also excluded the ammonia data for the time period 9/10/00-10/31/00 because the detected values were abnormally high and the plant personnel confirmed that the facility's gas handling and chemical recovery system failed during that time period.

EPA excluded all benzo(a)pyrene data from this episode because of concerns about the analytical methods (see Section 4.4.15, DCNs IS07040 and IS07051 in Sections 8.4 and 8.5 of the proposal record). In addition, the Agency also excluded the O&G data from this episode because the facility did not use Method 1664.

- **ISM51 --** EPA excluded all the data dated after March 1, 1998 because the facility operated a treatment system different from the BAT-1 model technology starting from that date. As a result, the data from this facility were not used to develop the limits for benzo(a)pyrene, and naphthalene.

  In addition, EPA also excluded all the total cyanide data, as measured by SM4500. EPA excluded the first six of the eight data values, which were all reported as detected at the same value of 12 mg/L, due to concerns about the level of precision attained by the laboratory. Data are seldom reported at the same value unless they are non-detected or close to the lowest level that can be measured by the chemical analytical method, which in this case was 0.02 mg/L. EPA also excluded the last two of the eight data values (8 and 8.7 mg/L) because these were also measured by SM4500. EPA concluded that all results were probably unreliable from this method during the self-monitoring episode.

  Lastly, EPA excluded all TSS data from this episode because the facility discharged indirectly prior to March 1998. As a result, the facility's discharge limits for TSS prior to March 1998 would expected to be high because POTWs are specifically designed and operated to treat pollutants such as TSS.

In summary, the episodes selected for each regulated pollutant in the by-product recovery segment of the cokemaking subcategory are as follows:

- **Ammonia as Nitrogen** -- EPA had concentration data from one sampling episode ESE02, and two self-monitoring episodes (ISM50 and ISM51).

- **Benzo(a)pyrene** -- EPA used data from its sampling episode ESE02 to develop the promulgated limitations for BAT-1.

- **Naphthalene** -- EPA calculated the limitations using the data from episodes ESE01, ESE02, and ISM50.

- **Phenols (4AAP)** -- EPA used data from all four episodes.

- **Total Cyanide** -- For the total cyanide standards, EPA used data from one facility, representing sampling episode (ESE01) and one self-monitoring episode (ISM50), to establish the limits. EPA did this to address commenters' concern that the total cyanide limits are not achievable. This facility demonstrated the highest influent concentration of total cyanide. Therefore, EPA concluded that if this facility can achieve the limit, then the other facilities should be able to do the same. See DCN IS10884 in Section 14.10 of the rulemaking record for a more detailed discussion.

- **O&G –** For new direct dischargers, EPA used concentration data from its sampling episode (ESE02) for O&G measured as HEM. As explained in Section 14.1, industry did not measure O&G as HEM and thus none of the self-monitoring episodes were included in calculating the O&G limitations.

- **TSS** -- For new direct dischargers, EPA used concentration data from one self-monitoring episode (ISM50).

PSES-1

The PSES-1 option technology (mainly ammonia stripping) was used as the basis for the limitations for indirect dischargers. Eight facilities (corresponding to eight episodes) had the PSES-1 option technology. Of these facilities, EPA selected data from three facilities that met the criteria described in Section 14.1. DCN IS10816 in Section 14.10 of the rulemaking record discusses the facility selection process for the by-product recovery cokemaking segment in detail. Two of these episodes were EPA sampling episodes (ESE01 and ESE02) and one was self-monitoring episode (ISM54). EPA also included total cyanide data from ISM50 because the facility submitted three years of daily total cyanide measurements representing PSES-1 technology. None of the facilities commingled cokemaking wastewater with wastewater from other subcategories.

The direct dischargers represented in the two sampling episodes had employed the model technology that was the basis for the pretreatment standards. EPA used their data to calculate the pretreatment standards in conjunction with data from the indirect discharger (ISM54). EPA used data from these direct discharging facilities because EPA had data from intermediate sampling points representing the PSES-1 model technologies. However, for ammonia as nitrogen, EPA did not use data from ESE01 and ESE02 because the effluent at the intermediate sampling points, i.e., after ammonia still and before biological treatment, would not realistically represent effluent from an indirect discharger. Since biological treatment provides additional removal of ammonia, facilities with add-on biological treatment tend not to remove ammonia completely in the ammonia stripping step. As a result, EPA used the data from the indirect discharger (ISM54) to calculate the PSES-1 pretreatment standards for ammonia as nitrogen.

For total cyanide, EPA used data from ISM50. See the total cyanide discussion in the BAT-1 section. EPA excluded the total cyanide data for 2/04/99 because it was at least two orders of magnitude higher than the rest of the data, which represented five years worth of self-monitoring. Plant personnel suspected that the value is a typographical error.

For naphthalene, EPA used all three sampling episodes to develop the proposed pretreatment standards.

14.2.2 Sintering Subcategory

In October 2000, EPA proposed combining the sintering and ironmaking subcategories from the 1982 regulation into a single subcategory to be known as ironmaking, with a single technology basis. With the exception of cooling towers, which apply to blast furnace operations only, EPA considered the same technologies for both segments. The basis for the proposed ironmaking limits and standards for the sintering segment with wet air pollution control system was: *solids removal with high-rate recycle and metals precipitation, alkaline chlorination, and mixed media filtration of blowdown wastewater.* This was known as Ironmaking BAT1. Since EPA has determined that BAT1 is not the best achievable technology for ironmaking (and, subsequently, sintering) operations (see preamble Section VIII.B). EPA has also concluded that it is unnecessary to combine the two 1982 subcategories into a single subcategory as proposed, because the final rule is not changing the 1982 limits and standards except as noted below.

In the final rule, EPA promulgated an effluent limitation guideline and standard for one parameter, 2,3,7,8-TCDF, for sintering operations with wet air pollution control, and left unchanged the 1982 limits and standards for all other parameters in the sintering and ironmaking subcategories. EPA chose to use 2,3,7,8-TCDF as an indicator parameter for the whole family of dioxin/furan congeners for several reasons. First, 2,3,7,8-TCDF is the most toxic of the congeners found in treated sintering wastewater. Second, 2,3,7,8-TCDF was one of the most prevalent of the dioxin/furan congeners in these wastewaters. Finally, 2,3,7,8-TCDF is chemically similar to the other dioxin/furan congeners and its removal will similarly indicate removal of the other congeners.

The technology basis for new TCDF limitations and standards for the sintering subcategory remains unchanged from the proposal, which is the same as the technology basis for the 1982 regulations except for the addition of multimedia filtration. During four EPA sampling episodes, several of these congeners were found in both the raw and treated wastewater from sinter plants operating wet air pollution control technologies. Although none of the sampled facilities has this technology in place, EPA concludes that multimedia filtration will result in the removal of this congener, and thus all the dioxin/furan congeners, below the minimum level specified in Method 1613, because dioxins and furans are hydrophobic compounds, meaning they tend to adhere to solids present in a solution. Thus removal of the solids, which is accomplished by multimedia filtration, will result in removal of the dioxins/furans adhering to them as well. Furthermore, EPA has data from two sampling episodes at sinter plants demonstrating that filtration of wastewater samples containing dioxins and furans at treatable levels will reduce their concentrations to non-detectable levels (see DCN IS10853 in Section 14.10 of the rulemaking record for more information). This is true even for raw wastewater that has undergone no other treatment. As a result, the TCDF limit is expressed as "<ML," which means less than the minimum level.

EPA is also promulgating, as proposed, a provision that the total recoverable chlorine (TRC) BAT limitations or NSPS promulgated in 1982 apply only when sintering process wastewater is chlorinated.

For indirect dischargers, sintering facilities discharging to POTWs with nitrification capability would not be subject to the pretreatment standard for ammonia-N.

EPA is leaving unchanged all limitations currently in effect for the ironmaking subcategory, except to delete the limitations for the obsolete ferromanganese blast furnaces. EPA had proposed limits and standards for 2,3,7,8-TCDF for the ironmaking subcategory, but it was to apply only to facilities that combined their blast furnace and sintering wastewater. 2,3,7,8-TCDF was not found in the blast furnace wastewater. Facilities with combined blast furnace and sintering wastewater recycling systems may monitor for 2,3,7,8-TCDF after these two waste streams are combined to ensure compliance, but before commingling with wastewaters other than sintering or blast furnace wastewater. See Section 16.8.3 for more information regarding the compliance monitoring location and an exception which allows commingling with wastewaters other than sintering or blast furnace wastewater. By preserving the 1982 subcategorization scheme and promulgating limits and standards for the compound in the sintering subcategory, EPA has addressed this issue, and is therefore not promulgating limits and standards for 2,3,7,8-TCDF for the ironmaking subcategory.

14.2.3 Other Operations

The other operations subcategory has three segments: the direct-reduced ironmaking (DRI) segment, the forging segment, and the briquetting segment. For the briquetting segment, EPA is promulgating *no discharge of process wastewater pollutants to waters of the United States* as discussed in Section 9. The next two subsections describe the data used to calculate the limitations for the remaining two segments.

Direct-Reduced Ironmaking

The DRI_BPT option technology is the basis for the limitations for the direct dischargers in the direct-reduced ironmaking segment of the other operations subcategory. EPA selected data from one facility that had the model technology for TSS (and met the criteria in Section 14.1), which is the only regulated pollutant in this segment. This treatment system treats water only from direct-reduced ironmaking processes (a small amount of storm water and equipment cleaning water is also treated in the treatment system). For this facility, EPA had data from one sampling episode (ESE10) and one self-monitoring episode (ISM65) that it used to calculate the limitations for TSS. EPA included all of these data in calculating the TSS limitations. O&G (measured by HEM) data from ESE10 were excluded from pollutant removal evaluation because of LTA test.

Forging

For the forging segment, EPA promulgated limitations for O&G and TSS for direct dischargers. EPA did not sample forging operations or obtain any forging self-monitoring data from facilities with the model technology. Because EPA has determined that the characteristics of forging operation wastewater are similar to hot forming operation wastewater, EPA transferred the limitations from both segments of the Integrated and Stand-Alone Hot Forming Subcategory. The facilities used to develop the limits are ESE04, ESE07, and ESE09. Because, depending on the materials used, the forging operations can create wastestreams similar to either of the hot forming segments, EPA transferred the data from the two segments. For ESE04, O&G and TSS data did not pass the LTA test and they were not included in the limits development.

14.3 Data Exclusions and Substitutions

In some cases, EPA did not use all of the data described in Section 14.2 in calculating the limitations. Other than the data exclusions and substitutions described in this section and those resulting from the data editing procedures, EPA has used the data from the episodes and sampling points presented in Appendix C.

In general, EPA used the reported measured value or sample-specific detection limit in its calculations. However, there were instances where EPA substituted baseline values (defined in Section 4) for reported values. In this case, EPA compared each laboratory-reported sample result to a baseline value. In some situations, EPA substituted a larger value for the measured value or sample-specific detection limit. This substitution is described in Sections 4.4.1 and 4.5.1. Appendix C and the minimums and maximums provided in Attachment 14-1 in Appendix E list the data before these substitutions.

14.4 Data Aggregation

In some cases, EPA determined that two or more samples had to be mathematically aggregated to obtain a single value that could be used in other calculations. In some cases, this meant that field duplicates and grab samples were aggregated for a single sampling point. In addition, for one facility, data were aggregated to obtain a single daily value representing the facility's effluent from multiple outfalls. Appendix C lists the data after these aggregations were completed and a single daily value was obtained for each day for each pollutant.

In all aggregation procedures, EPA considered the censoring type associated with the data. EPA considered measured values to be detected. In statistical terms, the censoring type for such data was 'non-censored' (NC). Measurements reported as being less than some sample-specific detection limit (e.g., <10 mg/L) were censored and were considered to be non-detected

(ND). In the tables and data listings in this document and the record for the rulemaking, EPA has used the abbreviations NC and ND to indicate the censoring types.[2]

The distinction between the two censoring types is important because the procedure used to determine the variability factors considers censoring type explicitly. This estimation procedure modeled the facility datasets using the modified delta-lognormal distribution. In this distribution, data are modeled as a mixture of two distributions. Thus, EPA concluded that the distinctions between detected and non-detected measurements were important and should be an integral part of any data aggregation procedure. (See Appendix B for a detailed discussion of the modified delta-lognormal distribution.)

Because each aggregated data value entered into the modified delta-lognormal model as a single value, the censoring type associated with that value was also important. In many cases, a single aggregated value was created from unaggregated data that were all either detected or non-detected. In the remaining cases with a mixture of detected and non-detected unaggregated values, EPA determined that the resulting aggregated value should be considered to be detected because the pollutant was measured at detectable levels.

This section describes each of the different aggregation procedures. They are presented in the order that the aggregation was performed. That is, field duplicates were aggregated first, grab samples second, and finally multiple outfalls.

14.4.1 Aggregation of Field Duplicates

During the EPA sampling episodes, EPA collected a small number of field duplicates. Generally, ten percent of the number of samples collected were duplicated. Field duplicates are two samples collected for the same sampling point at approximately the same time, assigned different sample numbers, and flagged as duplicates for a single sampling point at a facility.

Because the analytical data from each duplicate pair characterize the same conditions at that time at a single sampling point, EPA aggregated the data to obtain one data value for those conditions. The data value associated with those conditions was the arithmetic average of the duplicate pair.

In most cases, both duplicates in a pair had the same censoring type. In these cases, the censoring type of the aggregate was the same as the duplicates. In the remaining cases, one duplicate was a non-censored value and the other duplicate was a non-detected value. In these cases, EPA determined that the appropriate censoring type of the aggregate was 'non-censored' because the pollutant had been present in one sample. (Even if the other

[2]Laboratories can also report numerical results for specific pollutants detected in the samples as "right-censored." Right-censored measurements are those that are reported as being greater than the highest calibration value of the analysis (e.g., >1000 μg/L). None of the data used in calculating the limitations included any right-censored data.

duplicate had a zero value[3], the pollutant still would have been present if the samples had been physically combined.) Table 14-1 summarizes the procedure for aggregating the analytical results from the field duplicates. This aggregation step for the duplicate pairs was the first step in the aggregation procedures for both influent and effluent measurements.

14.4.2 Aggregation of Grab Samples

During the EPA sampling episodes, EPA collected two types of samples: grab and composite. Typically, EPA collected composite samples. Of the pollutants promulgated for regulation, O&G was the only one for which the chemical analytical method specifies that grab samples must be used. For O&G, EPA collected multiple (usually four) grab samples during a sampling day at a sampling point. To obtain one value characterizing the pollutant levels at the sampling point on a single day, EPA mathematically aggregated the measurements from the grab samples.

The procedure arithmetically averaged the measurements to obtain a single value for the day. When one or more measurements were non-censored, EPA determined that the appropriate censoring type of the aggregate was 'non-censored' because the pollutant was present. Table 14-2 summarizes the procedure.

14.4.3 Aggregation of Data Across Outfalls ("Flow-Weighting")

After field duplicates and grab samples were aggregated, the data were further aggregated across sampling points for different outfalls. This step was necessary for the facilities where data from multiple sampling points were aggregated to obtain a single daily value representing the episode's effluent from multiple outfalls. In aggregating values across sampling points, if one or more of the values were non-censored, then the aggregated result was non-censored (because the pollutant was present in at least one stream). When all of the values were non-detected, then the aggregated result was considered to be non-detected. The procedure for aggregating data across streams is summarized in Table 14-3. The following example demonstrates the procedure for hypothetical pollutant X at an episode with three outfalls all from the model technology on day 1 of the sampling episode.

<u>Example of calculating an aggregated flow-weighted value:</u>

Day	Sampling Point	Flow (gal)	Concentration (µg/L)	Censoring
1	SP-A	10,000,000	10	ND
1	SP-B	20,000,000	50	NC
1	SP-C	5,000,000	100	ND

[3]This is presented as a 'worst-case' scenario. In practice, the laboratories cannot measure 'zero' values. Rather they report that the value is less than some level (see Section 4).

Calculation to obtain aggregated, flow-weighted value:

$$\frac{(10{,}000{,}000 \text{ gal} \times 10 \ \mu g/L) + (20{,}000{,}000 \text{ gal} \times 50 \ \mu g/L) + (5{,}000{,}000 \text{ gal} \times 100 \ \mu g/L)}{10{,}000{,}000 \text{ gal} + 20{,}000{,}000 \text{ gal} + 5{,}000{,}000 \text{ gal}} = 45.7 \ \mu g/L \qquad (14\text{-}1)$$

Because one of the three values was non-censored, the aggregated value of 45.7 µg/L is non-censored.

14.5 Data Editing Criteria

After excluding some data and aggregating the data, EPA applied data editing criteria to select episode datasets to be used in calculating the long-term averages and limitations. This criteria was specified by the ‘long-term average test’ (or LTA test).

EPA established the long-term average test to ensure that the pollutants were present in the influent at sufficient concentrations to evaluate treatment effectiveness during the episode. After the data aggregation, EPA compared the daily values of influent and their long-term average to the baseline value described in Section 4. The influent had to pass a basic requirement and one of the following two steps to pass the LTA test:

Step 1. At least 50% of the influent measurements in an episode were detected at the levels that are any value equal to or greater than 10 times the baseline value (defined in Section 4).

Step 2. At least 50% of the influent measurements in an episode were detected and the episode influent LTA was equal to or greater than 10 times the baseline value (defined in Section 4).

When the dataset at an episode failed both steps, EPA excluded the effluent data for the episode in calculating the long-term averages, variability factors, and limitations for the corresponding option in the subcategory. In this manner, EPA would ensure that its limitations resulted from treatment and not simply the absence of that pollutant in the wastestream.

If influent data were unavailable for the episode, the effluent data were assumed to pass the LTA test. EPA decided to use these data for two reasons. First, EPA wanted to include as much data as possible in its calculations. Second, the vast majority of pollutants for which industry supplied self-monitoring data are pollutants regulated in the existing iron and steel regulation; EPA has already established the presence of the regulated pollutants in treatable levels in iron and steel wastestreams. Therefore, EPA is confident that these effluent data represent effective treatment and not the absence of the pollutant in the wastestream. See Appendix C for the results of the LTA test.

14.6 Overview of Limitations

The preceding sections discuss the data selected as the basis for the limitations and the data aggregation procedures EPA used to obtain daily values in its calculations. This section provides a general overview of limitations before returning to the development of the limitations for the iron and steel industry. This section describes EPA's objective for daily maximum and monthly average limitations, the selection of percentiles for those limitations, and compliance with final limitations. EPA has included this discussion in Section 14 because these fundamental concepts are often the subject of comments on EPA's effluent guidelines regulations and in EPA's contacts and correspondence with the iron and steel industry.

14.6.1 Objective

In establishing daily maximum limitations, EPA's objective is to restrict the discharges on a daily basis at a level that is achievable for a facility that targets its treatment at the long-term average. EPA acknowledges that variability around the long-term average results from normal operations. This variability means that occasionally facilities may discharge at a level that is greater than the long-term average. This variability also means that facilities may occasionally discharge at a level that is considerably lower than the long-term average. To allow for these possibly higher daily discharges, EPA has established the daily maximum limitation. A facility that discharges consistently at a level near the daily maximum limitation would not be operating its treatment to achieve the long-term average, which is part of EPA's objective in establishing the daily maximum limitations. That is, targeting treatment to achieve the limitations may result in frequent values exceeding the limitations due to routine variability in treated effluent.

In establishing monthly average limitations, EPA's objective is to provide an additional restriction to help ensure that facilities target their average discharges to achieve the long-term average. The monthly average limitation requires continuous dischargers to provide on-going control, on a monthly basis, that complements controls imposed by the daily maximum limitation. In order to meet the monthly average limitation, a facility must counterbalance a value near the daily maximum limitation with one or more values well below the daily maximum limitation. To achieve compliance, these values must result in a monthly average value at or below the monthly average limitation.

14.6.2 Selection of Percentiles

EPA calculates limitations based upon percentiles chosen with the intention, on one hand, to be high enough to accommodate reasonably anticipated variability within control of the facility and, on the other hand, to be low enough to reflect a level of performance consistent with the Clean Water Act requirement that these effluent limitations be based on the "best" technologies. The daily maximum limitation is an estimate of the 99th percentile of the distribution of the *daily* measurements. The monthly average limitation is an estimate of the 95th percentile of the distribution of the *monthly* averages of the daily measurements.

The 99th and 95th percentiles do not relate to, or specify, the percentage of time a discharger operating the "best available" or "best available demonstrated" level of technology will meet (or not meet) the limitations. Rather, the use of these percentiles relate to the development of limitations. (The percentiles used as a basis for the limitations are calculated using the products of the long-term averages and the variability factors as explained in the next section.) If a facility is designed and operated to achieve the long-term average on a consistent basis and the facility maintains adequate control of its processes and treatment systems, the allowance for variability provided in the limitations is sufficient to meet the requirements of the rule. The use of 99 percent and 95 percent represents a need to draw a line at a definite point in the statistical distributions (100 percent is not feasible because it represents an infinitely large value) and a policy judgment about where to draw the line that would ensure that operators work hard to establish and maintain the appropriate level of control. In essence, in developing the limitations, EPA has taken into account the reasonable anticipated variability in discharges that may occur at a well-operated facility. By targeting its treatment at the long-term average, a well-operated facility should be capable of complying with the limitations at all times because EPA has incorporated an appropriate allowance for variability into the limitations.

In conjunction with the statistical methods, EPA performs an engineering review to verify that the limitations are reasonable based upon the design and expected operation of the control technologies and the facility process conditions. As part of that review, EPA examines the range of performance by the facility datasets used to calculate the limitations. Some facility datasets demonstrate the best available technology. Other facility datasets may demonstrate the same technology, but not the best demonstrated design and operating conditions for that technology. For these facilities, EPA will evaluate the degree to which the facility can upgrade its design, operating, and maintenance conditions to meet the limitations. If such upgrades are not possible, then the limitations are modified to reflect the lowest levels that the technologies can reasonably be expected to achieve.

14.6.3 Compliance with Limitations

EPA promulgates limitations that facilities are capable of complying with at all times by properly operating and maintaining their processes and treatment technologies. However, the issue of exceedances or excursions (i.e., values that exceed the limitations) is often raised by comments on limitations. For example, comments often suggest that EPA include a provision that a facility is in compliance with permit limitations if its discharge does not exceed the specified limitations, with the exception that the discharge may exceed the monthly average limitations one month out of 20 and the daily average limitations one day out of 100. This issue was, in fact, raised in other rules, including EPA's final Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) rulemaking. EPA's general approach there for developing limitations based on percentiles is the same in this rule, and was upheld in <u>Chemical Manufacturers Association v. U.S. Environmental Protection Agency</u>, 870 F.2d 177, 230 (5th Cir. 1989). The Court determined that:

> EPA reasonably concluded that the data points exceeding the 99th and 95th percentiles represent either quality-control problems or upsets because there can

> be no other explanation for these isolated and extremely high discharges. If these data points result from quality-control problems, the exceedances they represent are within the control of the plant. If, however, the data points represent exceedances beyond the control of the industry, the upset defense is available. Id. at 230.

More recently, this issue was raised in EPA's Phase I rule for the pulp and paper industry. In that rulemaking, EPA used the same general approach for developing limitations based on percentiles that it had used for the OCPSF rulemaking and for today's rule. This approach for the monthly average limitation was upheld in National Wildlife Federation, et al v. Environmental Protection Agency, No. 99-1452, Slip Op. at Section III.D (D.C. Cir.) (April 19, 2002). The Court determined that:

> EPA's approach to developing monthly limitations was reasonable. It established limitations based on percentiles achieved by facilities using well-operated and controlled processes and treatment systems. It is therefore reasonable for EPA to conclude that measurements above the limitations are due to either upset conditions or deficiencies in process and treatment system maintenance and operation. EPA has included an affirmative defense that is available to mills that exceed limitations due to an unforeseen event. EPA reasonably concluded that other exceedances would be the result of design or operational deficiencies. EPA rejected Industry Petitioners' claim that facilities are expected to operate processes and treatment systems so as to violate the limitations at some pre-set rate. EPA explained that the statistical methodology was used as a framework to establish the limitations based on percentiles. These limitations were never intended to have the rigid probabilistic interpretation that Industry Petitioners have adopted. Therefore, we reject Industry Petitioners' challenge to the effluent limitations.

As that Court recognized, EPA's allowance for reasonably anticipated variability in its effluent limitations, coupled with the availability of the upset defense, reasonably accommodates acceptable excursions. Any further excursion allowances would go beyond the reasonable accommodation of variability and would jeopardize the effective control of pollutant discharges on a consistent basis and/or bog down administrative and enforcement proceedings in detailed fact finding exercises, contrary to Congressional intent. See, e.g., Rep. No. 92-414, 92d Congress, 2d Sess. 64, reprinted in A Legislative History of the Water Pollution Control Act Amendments of 1972 at 1482; Legislative History of the Clean Water Act of 1977 at 464-65.

EPA recognizes that the preceding discussion is inconsistent with Appendix A in two of the development documents for the 1982 rule. (The same appendix is attached to both documents.) This appendix incorrectly implies that EPA condones periodic violations of monthly average limitations in its statement that

> . . . it would be expected that 95 percent of the randomly observed 30-day average values from a treatment system discharging the pollutant at a known mean concentration will fall below this bound. Thus, a well operated plant would be

expected, on the average, to incur approximately one violation of the 30-day average limitation during a 20 month period.

This statement does not accurately reflect EPA's interpretation of its 1982 regulations, nor of today's limitations. Rather, EPA expects that facilities will comply with promulgated limitations *at all times*. If the exceedance is caused by an upset condition, the facility would have an affirmative defense to an enforcement action if the requirements of 40 CFR 122.41(n) are met. If the exceedance is caused by a design or operational deficiency, then EPA has determined that the facility's performance does not represent the appropriate level of control (best available technology for existing sources; best available demonstrated technology for new sources). For promulgated limitations and standards, EPA has determined that such exceedances can be controlled by diligent process and wastewater treatment system operational practices such as frequent inspection and repair of equipment, use of back-up systems, and operator training and performance evaluations.

14.7 Summary of the Limitations

The limitations for pollutants for each option are provided as 'daily maximums' and 'maximums for monthly averages' (except for pH as described below). Definitions provided in 40 CFR 122.2 state that the daily maximum limitation is the "highest allowable 'daily discharge'" and the maximum for monthly average limitation (also referred to as the "average monthly discharge limitation") is the "highest allowable average of 'daily discharges' over a calendar month, calculated as the sum of all 'daily discharges' measured during a calendar month divided by the number of 'daily discharges' measured during that month." Daily discharges are defined to be the "'discharge of a pollutant' measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling."

EPA has calculated four types of limitations for the iron and steel industry as follows:

Type 1: Daily maximum and monthly average limitations expressed in terms of allowable pollutant discharge (pounds) per unit of production (short tons). Most of the limitations are of this type.

Type 2: The limitations for pH are specified as a range of values between 6 and 9. The limitations are discussed in Section 14.3 of the rulemaking record at DCN IS10885.

Type 3: Daily maximum limitations for 2,3,7,8-tetrachlorodibenzo-furan (TCDF) are expressed as less than the minimum level ("<ML") or ten parts per quadrillion using the analytical method for TCDF specified in 40 CFR 420.21(c). These limitations are specified as daily maximums for the Sintering Subcategory. EPA has not promulgated monthly average limitations for this pollutant because EPA assumed that facilities will monitor for this pollutant only

once a month. EPA believes that a monthly monitoring frequency is reasonable because 12 data points for 2,3,7,8-TCDF each year will yield a meaningful basis for establishing compliance with the promulgated 2,3,7,8-TCDF limitations and standards by presenting long-term trends and short-term variability in 2,3,7,8-TCDF.

Type 4: For certain processes and discharge types (that is, some new sources and indirect dischargers), EPA has determined that there shall be *no discharge of process wastewater pollutants to waters of the United States.* This requirement is discussed in Section 13.

The remainder of Section 14 mainly describes the development of the limitations corresponding to Type 1. In this document and elsewhere, EPA refers to such limitations as 'production-normalized.' EPA has promulgated production-normalized limitations in terms of daily maximums and maximum for monthly averages for all pollutants.

To derive the production-normalization limitations, EPA used the modified delta-lognormal distribution to develop limitations based upon the concentration data ("concentration-based limitations"). Section 14.8 describes the calculations for the concentration-based limitations. Section 14.9 describes the conversion of these limitations to "production-normalized limitations" using the model flow rates described in Section 13.

14.8 Estimation of Concentration-Based Limitations

In estimating the concentration-based limitations, EPA determines an average performance level (the "option long-term average" discussed in the next section) that a facility with well-designed and operated model technologies (which reflect the appropriate level of control) is capable of achieving. This long-term average is calculated from the data from the facilities using the model technologies for the option. EPA expects that all facilities subject to the limitations will design and operate their treatment systems to achieve the long-term average performance level on a consistent basis because facilities with well-designed and operated model technologies have demonstrated that this can be done.

In the second step of developing a limitation, EPA determines an allowance for the variation in pollutant concentrations when processed through extensive and well-designed treatment systems. This allowance for variance incorporates all components of variability including shipping, sampling, storage, and analytical variability. This allowance is incorporated into the limitations through the use of the variability factors which are calculated from the data from the facilities using the model technologies. If a facility operates its treatment system to meet the relevant long-term average, EPA expects the facility will be able to meet the limitations. Variability factors assure that normal fluctuations in a facility's treatment are accounted for in the limitations. By accounting for these reasonable excursions above the long-term average, EPA's use of variability factors results in limitations that are generally well above the actual long-term averages.

Facilities that are designed and operated to achieve long-term average effluent levels used in developing the limitation should be capable of compliance with the limitations, which incorporate variability, at all times.

After the proposal, EPA incorporated adjustments for autocorrelation into the limitations for some pollutants. When data are said to be positively autocorrelated, it means that measurements taken at specific time intervals (such as 1 day or 2 weeks apart) are related. To determine if autocorrelation exists in the data, a statistical evaluation is required using many measurements for equally spaced intervals over an extended period of time. Where such data were available for the final rule, EPA performed a statistical evaluation of autocorrelation and if necessary provided adjustments to the limitations as explained in DCN IS12033 in Section 16.4 of the record. As a result of its evaluation of autocorrelation, EPA determined that adjustments should be incorporated into the limitations for total cyanide and ammonia as nitrogen for the cokemaking by-product recovery segment. EPA was only able to evaluate the autocorrelation in some datasets selected as the basis for the limitations for those pollutants. Where a dataset was insufficient for purposes of evaluating autocorrelation, EPA transferred the values it used in the adjustment ("rho values") as shown in Attachments 14-5 and 14-6 in Appendix E. These autocorrelation adjustments resulted in higher limitations for total cyanide and ammonia as nitrogen. Appendix B explains autocorrelation and the adjustments for these limitations in further detail. DCN IS12033 describes EPA's evaluation of autocorrelation in the episode datasets.

The following sections describe the calculation of the option long-term averages and option variability factors.

14.8.1 Calculation of Option Long-Term Averages

This section discusses the calculation of long-term averages by episode ("episode-specific long-term average") and by option ("option long-term average") for each pollutant. These long-term averages discussed in this section were used to calculate the limitations and as the option long-term averages for the pollutants of concern.

First, EPA calculated the episode-specific long-term average by using either the modified delta-lognormal distribution or the arithmetic average (see Appendix B). In Attachment 14-2 in Appendix E, EPA has listed the arithmetic average (column labeled 'Obs Mean') and the estimated episode-specific long-term average (column labeled 'Est LTA'). If EPA used the arithmetic average as the episode long-term average, then the two columns have the same value.

Second, EPA calculated the option long-term average for a pollutant as the *median* of the episode-specific long-term averages for that pollutant from selected episodes with the technology basis for the option (see Sections 14.1 and 14.2). The median is the midpoint of the values ordered (i.e., ranked) from smallest to largest. If there is an odd number of values (with n=number of values), then the value of the (n+1)/2 ordered observation is the median. If there are an even number of values, then the two values of the n/2 and [(n/2)+1] ordered observations are arithmetically averaged to obtain the median value.

For example, for subcategory Y option Z, if the four (i.e., n=4) episode-specific long-term averages for pollutant X are:

Facility	Episode-Specific Long-Term Average
A	20 mg/l
B	9 mg/l
C	16 mg/l
D	10 mg/l

then the ordered values are:

Order	Facility	Episode-Specific Long-Term Average
1	A	9 mg/l
2	B	10 mg/l
3	C	16 mg/l
4	D	20 mg/l

And the pollutant-specific long-term average for option Z is the median of the ordered values (i.e., the average of the 2nd and 3rd ordered values): (10+16)/2 mg/l = 13 mg/l.

The option long-term averages were used in developing the limitations for each pollutant within each regulatory option.

14.8.2 Calculation of Option Variability Factors

In developing the option variability factors used in calculating the limitations, EPA first developed daily and monthly episode-specific variability factors using the modified delta-lognormal distribution. This estimation procedure is described in Appendix B. Attachment 14-2 in Appendix E lists the episode-specific variability factors.

After calculating the episode-specific variability factors, EPA calculated the option daily variability factor as the *mean* of the episode-specific daily variability factors for that pollutant in the subcategory and option. Likewise, the option monthly variability factor was the mean of the episode-specific monthly variability factors for that pollutant in the subcategory and option. Attachment 14-3 in Appendix E lists the option variability factors.

14.8.3 Transfers of Option Variability Factors

After estimating the option variability factors, EPA identified several pollutants for which variability factors could not be calculated in some options. This resulted when all episode datasets for the pollutant in the option had too few detected measurements to calculate episode-specific variability factors (see data requirements in Appendix E). For example, if a pollutant had all non-detected values for all of the episodes in an option, then it was not possible to calculate option variability factors. When EPA could not calculate the option variability factors, EPA selected variability factors from other sources to provide an adequate allowance for variability in the limitations. This section describes these cases.

Table 14-4 lists the pollutants for which EPA was unable to calculate option variability factors. The following paragraphs describe EPA's determination for each case.

For benzo(a)pyrene in the BAT-1 option of the Cokemaking Subcategory, EPA transferred the option variability factors for naphthalene from the same option. EPA expects that these two pollutants would have similar variability in the effluent concentrations because they are chemically similar.

For O&G, because there were too few detected measurements, option variability factors could not be calculated from data that passed the LTA test described in Section 14.5. Because EPA expects that the variability in the effluent would be similar, EPA has used the variability factors from an episode ESE01 in that option, which did not pass the LTA test.

14.8.4 Summary of Steps Used to Derive Concentration-Based Limitations

This section summarizes the steps used to derive the concentration-based limitations. For each pollutant in an option for a subcategory, EPA performed the following steps in calculating the concentration-based limitations:

Step 1. EPA calculated the *episode-specific long-term averages and daily and monthly variability factors* for all selected episodes with the model technology for the option in the subcategory. (See Section 14.2 for selection of episodes and Attachment 14-2 in Appendix E for episode-specific long-term averages and variability factors.)

Step 2. EPA calculated the *option long-term average* as the median of the episode-specific long-term averages. (See Attachment 14-3 in Appendix E.)

Step 3. EPA calculated the *option variability factors* for each pollutants as the mean of the episode-specific variability factors from the episodes with the model technology. (See Attachment 14-3 in Appendix E.) The option daily variability factor is the mean of the episode-specific daily variability factors. Similarly, the option monthly variability factor is the mean of the episode-specific monthly variability factors.

Step 4. For the pollutants for which Steps 1 and 3 failed to provide option variability factors, EPA determined variability factors on a case-by-case basis. (See Section 14.8.3 and Attachment 14-4 in Appendix E.)

Step 5. EPA calculated each concentration-based *daily maximum limitation* for a pollutant using the product of the option long-term average and the option daily variability factor. (See Attachment 14-3 in Appendix E.)

Step 6. EPA calculated each concentration-based *monthly average limitation* for a pollutant using the product of the option long-term average and the option monthly variability factor. (See Attachment 14-3 in Appendix E.)

Step 7. EPA *compared* the daily maximum limitations to the data used to develop the limitations. EPA performed this comparison to determine if EPA used appropriate distributional assumptions for the data used to develop the limitations, in other words, whether the curves EPA used provide a reasonable "fit" to the actual effluent data.[4]

The next section describes the conversion of the concentration-based limitations to the production-normalized limitations that are provided in the regulation.

14.9 Conversion to Production-Normalized Limitations

The previous discussions about the limitations were based upon concentration data. The Part 420 regulation promulgated in 1982 and other previous mass-based regulations have presented pollutant limitations in terms of kilograms of allowable pollutant discharge per thousand kilograms of production (kg/kkg), also expressed as pounds of allowable pollutant discharge per thousand pounds of production (lbs/1,000 lbs). In the proposal, EPA expressed the limitations in terms of pounds of allowable pollutant discharge per ton of production (lbs/ton). Because comments on the proposal urged EPA to return to the units previously used in Part 420 (i.e., kg/kkg or lbs/1000 lbs), EPA has used these units for the final rule.

This section describes the conversion from concentration-based limitations to the production-normalized limitations in the regulation. This section also provides EPA's methodology for determining the number of significant digits to use for the production-normalized limitations.

[4]EPA believes that the fact that EPA performs such an analysis before promulgating limitations may give the impression that EPA expects occasional exceedances of the limitations. This conclusion is incorrect. EPA promulgates limitations that facilities are capable of complying with at all times by properly operating and maintaining their treatment technologies.

14.9.1 Conversion from Concentration-Based Limitations

In calculating the production-normalized limitations, EPA used the concentration-based limitations, the production flow rates, and the conversion factor. The concentration-based limitations are calculated as described in the previous section and are listed in Attachment 14-3 in Appendix E. The following paragraphs briefly describe the production flow rates and the conversion factor used to calculate the production-normalized limitations.

The production flow rates used in the calculation are expressed as production-normalized flow rates (PNFs) in terms of gallons of water discharged per thousand pounds of production (lbs/1,000 lbs) for all operations. The production-normalized flow rates are provided in Attachment 14-4 in Appendix E (the derivation of these flow rates is explained in Section 13).

EPA used following conversion factor to obtain limitations expressed as pounds per ton (lb/ton):

$$\text{conversion factor} = \frac{3.7854\ \text{L}}{\text{gal}} \times \frac{\text{lb}}{453.593 \times 10^{6}\ \mu\text{g}} \times \frac{\text{short ton}}{2 \times 1{,}000\ \text{lb}} = 4.1727 \times 10^{-9}\ \frac{\text{L / gal}}{\mu\text{g / lb}}\ \frac{\text{short ton}}{1{,}000\ \text{lb}} \qquad (14\text{-}2)$$

EPA used the production flows and the conversion factor to calculate each production-normalized limitation using the following basic equation:

Production-normalized limitation =
Concentration-based limitation × Production-normalized flow rate × conversion factor

The following is an example of applying the conversion factor:

> For the Cokemaking Subcategory option BAT-1, suppose the concentration-based daily maximum limitation is 100 µg/L. Using the production value of 113 gpt for the Cokemaking Subcategory, the production-normalized daily maximum limitation (limit_{pn}) is:

$$LTA_{pn} = \frac{100\ \mu\text{g}}{\text{L}} \times \frac{113\ \text{gal}}{\text{short ton}} \times 4.1727 \times 10^{-9}\ \frac{\text{L / gal}}{\mu\text{g / lb}} \times \frac{\text{short ton}}{1000\ \text{lb}} = 0.0000313\ \frac{\text{lb}}{1000\ \text{lb}}$$

14.9.2 Significant Digits for Production-Normalized Limitations

After completing the conversions described in the previous section, EPA generally rounded the production-normalized limitations to three significant digits. Because Section 14.3 of EPA method 1664A requires reporting of results for O&G below 10 mg/L to two significant digits, EPA has rounded the production-normalized limitations for O&G to two significant digits when the corresponding concentration-based limitation was less than 10 mg/L. EPA used a rounding procedure where values of five and above are rounded up and values of four and below are rounded down. For example, a value of 0.003455 would be rounded to 0.00346, while a value of 0.003454 would be rounded to 0.00345. The production-normalized limitations listed in Attachment 14-4 in Appendix E have three significant digits, except for some O&G limitations which have two significant digits.

14.10 Naphthalene PSES

For the naphthalene pretreatment standards for existing sources (PSES) in the cokemaking subcategory (by-product recovery segment), EPA has selected 100 µg/L and 83.1 µg/L as the concentration-based values used to calculate the final production-normalized daily maximum standard and monthly average standard, respectively. These values are different than the ones that EPA calculated applying the methodology described in the previous sections. When EPA applied its methodology to the data from the three episodes that demonstrated performance of the model technology, the resulting values of the daily maximum standard and monthly average standard were 26.1 µg/L and 21.7 µg/L, respectively. This section provides EPA's rationale for selecting different values for the final standards than those calculated from the data from the three episodes, ESE01, ESE02, and ISM54.

14.10.1 Daily Maximum Standard

As one of its seven steps in developing the standards, EPA compared the value that it had calculated for the daily maximum standard for naphthalene to the data used to develop the calculated standard. When naphthalene was detected, all samples had concentration values that were at or below 33 µg/L. When naphthalene was not detected, the sample-specific minimum levels (MLs) generally were close to the method ML of 10 µg/L for Method 1625. However, two of five samples from one EPA sampling episode, ESE02, were analyzed at a 10-fold dilution due to the amount of phenol in the sample, which made it impossible to identify naphthalene in the neat analysis. As a result of the 10-fold dilution of the samples, the sample-specific MLs had values of 100 µg/L. In examining the data for the other EPA sampling episode, ESE01, EPA determined that those samples also had high levels of phenol concentrations, even though the laboratory obtained sample-specific MLs close to the method MLs. (See DCN IS12035 in Section 16.4 of the record.) Thus, EPA determined that facilities with the model technology may have high levels of phenol that could interfere with the determination of naphthalene concentrations in their effluent. Although the laboratory overcame the phenol interferences in the five samples for one episode and succeeded in achieving sample-specific MLs with values close to the method ML of 10 µg/L, for the other EPA sampling episode, it could not do so for two samples. For the self-monitoring data for ISM54 that were determined by Method 625 rather than Method 1625, the facility reported sample-specific detection limits that were below the 10 µg/L.

While there was no evidence of any chromatographic peaks for naphthalene in the chromatograms associated with the two diluted samples, the best that EPA can say with a high degree of confidence is that the naphthalene concentrations were between zero (i.e., not present) and 100 µg/L for these two samples. In order to demonstrate compliance with the naphthalene standard, a sample would have to be analyzed with a sample-specific ML of at or below the standard. Because EPA could not overcome the phenol interferences without diluting the two samples, EPA cannot say with confidence that naphthalene samples can be analyzed with a sample-specific minimum level of less than 100 µg/L in every case. For this reason, EPA has determined that 100 µg/L should be the concentration-basis of today's daily maximum standard.

14.10.2 Monthly Average Standard

In establishing monthly average limitations and standards, EPA's objective is to provide an additional restriction that supports EPA's objective of having facilities control their average discharges at the long-term average. The monthly average limitation requires continuous dischargers to provide on-going control, on a monthly basis, that complements controls imposed by the daily maximum limitation. In order to meet the monthly average limitation, a facility must counterbalance a value near the daily maximum limitation with one or more values well below the daily maximum limitation. To achieve compliance, these values must result in a monthly average value at or below the monthly average limitation. (This explanation of EPA's objective was cited with approval by the Court as support in its decision in <u>National Wildlife Federation, et al. v. Environmental Protection Agency</u>, No. 99-1452 (DC Cir.) (April 19, 2002)).

Consistent with EPA's objective for the monthly average standard, EPA has determined that the concentration-based monthly average standard could be less than 100 µg/L, because EPA assumes that the facilities will monitor for naphthalene more than once a month. In fact, EPA has assumed that facilities will monitor four times a month and has accounted for those costs in this rule. In general, EPA expects that laboratories will usually be able to measure at levels lower than 100 µg/L, because most of the data supporting the standards demonstrated that laboratories could overcome interferences in the samples. Thus, it has established a value at 83.1 µg/L as the concentration-basis for the monthly average standard. In calculating this value, EPA first estimated the long-term average as the ratio of the daily maximum standard of 100 µg/L and the daily variability factor of 2.101 calculated using the data from the three episodes. Second, EPA calculated the monthly average standard as the product of the long-term average (47.596 µg/L) and the monthly variability factor of 1.746 also calculated using the data from the three episodes. This product was equal to 83.1 µg/L which EPA established as the concentration-basis for today's monthly average standard. This value of 83.1 µg/L is well above the largest measured value of 33 µg/L. As described in Section 14.9, EPA then converted this value to a production-normalized basis for today's regulation.

Table 14-1

Aggregation of Field Duplicates

If the field duplicates are:	Censoring type of average is:	Value of aggregate is:	Formulas for aggregate value of duplicates:
Both non-censored	NC	arithmetic average of measured values	$(NC_1 + NC_2)/2$
Both non-detected	ND	arithmetic average of sample-specific detection limits	$(DL_1 + DL_2)/2$
One non-censored and one non-detected	NC	arithmetic average of measured value and sample-specific detection limit	(NC + DL)/2

NC - non-censored (or detected).
ND - non-detected.
DL - sample-specific detection limit.

Table 14-2

Aggregation of Grab Samples

If the grab or multiple samples are:	Censoring type of Daily Value is:	Daily value is:	Formulas for Calculating Daily Value:
All non-censored	NC	arithmetic average of measured values	$$\frac{\sum_{i=1}^{n} NC_i}{n}$$
All non-detected	ND	arithmetic average of sample-specific detection limits	$$\frac{\sum_{i=1}^{n} DL_i}{n}$$
Mixture of non-censored and non-detected values (total number of observations is n=k+m)	NC	arithmetic average of measured values and sample-specific detection limits	$$\frac{\sum_{i=1}^{k} NC_i + \sum_{i=1}^{m} DL_i}{n}$$

NC - non-censored (or detected).
ND - non-detected.
DL - sample-specific detection limit.

Table 14-3

Aggregation of Data Across Streams

If the n observations are:	Censoring type is:	Formulas for value of aggregate
All non-censored	NC	$\dfrac{\sum_{i=1}^{n} NC_i \times flow_i}{\sum_{i=1}^{n} flow_i}$
All non-detected	ND	$\dfrac{\sum_{i=1}^{n} DL_i \times flow_i}{\sum_{i=1}^{n} flow_i}$
Mixture of k non-censored and m non-detected (total number of observations is n=k+m)	NC	$\dfrac{\sum_{i=1}^{k} NC_i \times flow_i + \sum_{i=1}^{m} DL_i \times flow_i}{\sum_{i=1}^{n} flow_i}$

NC - non-censored (or detected).
ND - non-detected.
DL - sample-specific detection limit.

Table 14-4

Cases where Option Variability Factors Could Not be Calculated

Subcategory	Option	Pollutant	Source of Variability Factors
Cokemaking	BAT-1	Benzo(a)pyrene	naphthalene, same option
		Oil and Grease	ESE01

SECTION 15

NON-WATER QUALITY ENVIRONMENTAL IMPACTS

Sections 304(b) and 306 of the Clean Water Act require EPA to consider non-water quality environmental impacts associated with effluent limitations guidelines and standards. These impacts are the environmental consequences not directly associated with the wastewater that may be associated with the regulatory options considered. In accordance with these requirements, EPA has considered the potential impacts of the regulation on energy consumption, air emissions, and solid waste generation. This section quantifies the non-water quality environmental impacts associated with the final rule.

15.1 Energy Requirement Impacts

Table 15-1 compares the current and incremental energy requirements for the subcategories for which EPA is promulgating new or revised effluent limitations. Table 15-2 provides a summary of the incremental energy requirements for all options and subcategories considered for the final rule.

EPA estimated the amount of energy currently consumed by the iron and steel industry from the values reported in the U.S. EPA Collection of 1997 Iron and Steel Industry Data, and used survey weights to normalize the data to a national average.

EPA determined the incremental energy requirements only for those new treatment units that EPA assumed would be necessary to comply with revised or new effluent limitations or standards. In general, additional energy requirements are a result of the electric motors in new or upgraded cooling water recycle and treatment systems to drive water pumps, chemical mixers, aeration equipment such as blowers and compressors, and cooling tower fans. EPA calculated energy requirements by summing the total horsepower (HP) needed for each recycling or treatment step, converting horsepower to kilowatts (kW), and multiplying by the operational time (hours). The equation below shows the conversion from total system horsepower to annual electrical usage (Reference 15-1) in kilowatt-hours per year (kWh/year).

$$\text{Energy Required} = 0.7456 \ \frac{\text{kW}}{\text{HP}} \times \text{HP} \times \text{HPY} \tag{15-1}$$

where:

HP = Total horsepower required by additional equipment; and
HPY = Hours per year of equipment operation.

15.1.1 Cokemaking Subcategory

This subcategory includes 12 direct dischargers and 8 indirect dischargers. As shown in Table 15-1, EPA has selected options BAT-1 and PSES-1 as the options for the final rulemaking for direct and indirect dischargers, respectively. The additional energy requirement of 16 million kWh/year for BAT-1 (Table 15-2) is attributed to four sites upgrading and optimizing existing biological treatment systems; one site installing a free ammonia distillation system; two sites installing additional biological treatment filters; two sites installing free and fixed ammonia distillation systems; one site installing a tar removal system, heat exchanger, biological treatment equalization tank, final cooler, and spare pump for coke quench water return, and upgrading controls on an existing ammonia distillation system; two sites installing biological treatment equalization tanks; two sites installing ammonia distillation equalization tanks; and one site installing additional aeration capacity for biological treatment. The additional energy requirement of 1 million kWh/year for PSES-1 (Table 15-2) is attributed to one site installing a free and fixed ammonia distillation system, four sites installing equalization tanks for ammonia distillation systems, and one site optimizing and upgrading an existing biological treatment system. Based on the industry survey data, EPA estimates that the cokemaking subcategory currently consumes more than 104 million kWh/year of energy. As such, the increased energy consumption by the BAT-1 and PSES-1 treatment options is approximately 16 percent of the total energy consumed by the subcategory (Table 15-1).

For the remaining options that EPA considered for the rulemaking, the increase in energy requirements to 24 million kWh/year for BAT-3 is based on all 13 direct dischargers installing breakpoint chlorination and 9 also installing multimedia filtration. For PSES-3, EPA estimates additional energy requirements totaling 16 million kWh/year based on five sites installing biological treatment systems.

Neither of the two non-recovery cokemaking facilities generate wastewater and, therefore, EPA estimates there will be no additional energy requirements for this industry segment.

15.1.2 Ironmaking Subcategory

This subcategory includes 15 direct dischargers and 1 indirect discharger. EPA did not revise limitations or standards for this subcategory so there are no additional energy requirements for this subcategory. The following discussion is based on the options EPA considered for the proposed ironmaking and sintering segments, but ultimately rejected, for the final rule.

EPA estimates an incremental energy requirement of 18 million kWh/year (Table 15-2) for BAT-1 based on the installation of 2 new high-rate recycle systems, 6 chemical precipitation systems, 6 solids handling systems, 12 multimedia filtration systems, 12 breakpoint chlorination systems, and 2 cooling towers and pumping stations. EPA does not expect the one indirect discharger to need additional treatment units to comply with PSES-1; therefore, this option would not have additional energy requirements. Based on industry survey data, EPA estimates that the ironmaking subcategory currently consumes more than 115 million kWh/year of energy. The increased energy consumption by the BAT-1 and PSES-1 treatment options would be approximately 16 percent of the total energy consumed by the subcategory.

15.1.3 Sintering Subcategory

The sintering subcategory includes five direct dischargers. In the final rule, EPA included limitations and standards for one additional parameter: 2,3,7,8-TCDF. The technology basis for these limitations and standards is multimedia filtration in addition to the 1982 technology basis.

EPA estimates that this subcategory will consume approximately 4 million kWh/year of additional energy (Table 15-2). EPA estimates that this increase in energy demand will result from four sites installing a multimedia filtration system and solids handling system, and one site installing a chemical precipitation system, solids handling system, and multimedia filtration system. Based on industry survey data, sintering operations currently consume approximately 17 million kWh/year of energy. The incremental energy demand represents a 24-percent increase (Table 15-1). Note that sintering operations comprise only a small portion of the total combined iron and steel operations conducted at these five sites. Therefore, the incremental energy demand for sintering operations is insignificant as compared to the total combined energy consumption at these sites.

15.1.4 Integrated Steelmaking Subcategory

This subcategory includes 20 direct dischargers and 1 indirect discharger. EPA did not revise limitations or standards for this subcategory so there are no additional energy requirements for this subcategory. The following discussion is based on the options EPA considered, but ultimately rejected, for the final rule.

The Agency estimates that the additional energy requirement of 12 million kWh/year (Table 15-2) for BAT-1 is the result of 25 chemical precipitation systems for treatment of blowdown water, 8 carbon dioxide injection systems, 1 new continuous caster high-rate recycle system, and modifications to 13 existing high-rate recycle systems to increase recycling capacity. EPA estimates that indirect discharging integrated steelmaking facilities would not need additional treatment units to upgrade to the model PSES-1 treatment system and, therefore, no additional energy requirements are expected. The treatment and recycle systems currently used by the industry include solids removal using a classifier and clarifier, induced draft cooling towers for vacuum degassing and continuous casting wastewater, and pump stations to return the treated and cooled water to the steelmaking process. The modified high-rate recycle systems include additional cooling towers, piping, and pump stations to increase recycling capacity. Chemical precipitation systems remove metals from the recycle system blowdown water and include reaction tanks with mixers, clarifiers, thickeners, and filter presses. Carbon dioxide injection systems, which include mixers and pressurized solution feed systems, remove scale-forming metal ions (hardness) from basic oxygen furnace (BOF) recycle water in wet-open and wet-suppressed combustion systems. Based on industry survey data, integrated steelmaking facilities currently consume approximately 707 million kWh/year of energy. The incremental energy demand would represent a 1.7-percent increase.

15.1.5 Integrated and Stand-Alone Hot Forming Subcategory

This subcategory includes 32 direct dischargers and 5 indirect dischargers. EPA did not revise limitations or standards for this subcategory so there are no additional energy requirements for this subcategory. The following discussion is based on the options EPA considered, but ultimately rejected, for the final rule.

EPA estimates that 214 million kWh/year of additional electricity would be necessary to comply with BAT-1. The Agency estimates that sites would install 14 high-rate recycle systems to replace existing partial or once-through treatment systems, 13 cooling towers and pumping stations to increase recycling capacity, and 18 multimedia filtration systems. For PSES-1, EPA expects that two carbon manufacturing facilities and two stainless facilities would install multimedia filters. As shown in Table 15-2, EPA estimated that indirect dischargers would need an additional 0.04 million kWh/year of electricity to comply with this technology option. The incremental increase in energy requirements due to BAT-1 and PSES-1 would represent a 56-percent increase over the current subcategory requirements of 383 million kWh/year, as reported in industry survey data.

15.1.6 Non-Integrated Steelmaking and Hot Forming Subcategory

This subcategory includes 34 direct dischargers, 12 indirect dischargers, and 2 sites that discharge both directly and indirectly. EPA did not revise limitations or standards for this subcategory so there are no additional energy requirements for this subcategory. The following discussion is based on the options EPA considered, but ultimately rejected, for the final rule.

The additional 33 million kWh/year of energy that EPA estimates would be required for BAT-1 (Table 15-2) for the non-integrated steelmaking and hot forming operations are due to the addition of 25 multimedia filters, 3 new high rate recycle systems, and 22 cooling towers and pumping stations to increase recycling capacity.

EPA estimates that an additional 0.5 million kilowatt-hours of energy would be necessary to comply with PSES-1 for non-integrated steelmaking and hot forming sites (Table 15-2). EPA estimates that sites would install 11 multimedia filters in indirect discharging systems. Six sites would need additional cooling towers, pipes, and pumping stations to increase the recycling capacity of existing recycling systems. The incremental increase in energy requirements due to the BAT-1 and PSES-1 options would represent a 8-percent increase over the current subcategory requirement of 440 million kWh/year, as reported in industry survey data.

15.1.7 Steel Finishing Subcategory

This subcategory includes 57 direct dischargers and 32 indirect dischargers. EPA did not revise limitations or standards for this subcategory so there are no additional energy requirements for this subcategory. The following discussion is based on the options EPA considered, but ultimately rejected, for the final rule.

EPA estimates that 24 direct dischargers would install countercurrent rinse tanks to consume approximately 5 million kWh/year of additional energy (Table 15-2). For indirect dischargers, EPA estimates that an additional 0.1 kWh/year of energy would be required for four finishing sites to install countercurrent rinse tanks to achieve PSES-1. Based on industry survey data, steel finishing facilities currently consume approximately 260 million kWh/year of energy. The incremental energy demand would represent a 2-percent increase.

15.1.8 Other Operations Subcategory

The other operations subcategory includes direct-reduced ironmaking (DRI), forging, and briquetting operations. As shown in Table 15-1, EPA has selected the BPT-1 option for the final rulemaking. EPA estimates that an additional 0.01 kWh/year will be required for two forging facilities to install multimedia filters to meet BPT (Table 15-2). EPA estimates that the DRI facility will not need additional treatment equipment to meet BPT. The briquetting facilities do not discharge process wastewater; therefore, additional treatment equipment is not needed to achieve the effluent limitations. The incremental increase in energy generation for the other operations subcategory represents a 0.1-percent increase over the current subcategory requirement of 8 million kWh/year (Table 15-1).

15.1.9 Energy Requirements Summary

Based on information provided in the industry surveys, the iron and steel industry currently consumes approximately 2.0 billion kWh/year of energy for wastewater treatment. EPA estimates that compliance with the final iron and steel regulation will result in a net increase in energy consumption of 21 million kWh/year of electricity for the entire industry, or approximately 1.1 percent of existing requirements.

In 1997, the United States consumed approximately 3,122 billion kWh of electricity (Reference 15-2). The 21 million kWh/year increase in electricity as a result of the final regulation corresponds to less than 0.001 percent of the national requirements. The increase in energy requirements due to the implementation of the final rule will in turn increase air emissions from the electric power generation facilities. The increase in air emissions is expected to be proportional to the increase in energy requirements, or less than 0.001 percent.

15.2 <u>Air Emission Impacts</u>

Various subcategories within the iron and steel industry generate process waters that contain significant concentrations of organic and inorganic compounds, some of which are listed as Hazardous Air Pollutants (HAPs) in Title III of the Clean Air Act Amendments of 1990. The Agency developed National Emission Standards for Hazardous Air Pollutants (NESHAPs) under Section 112 of the Clean Air Act, which addresses air emissions of HAPs for certain manufacturing operations. Subcategories within the iron and steel industry where NESHAPs are applicable include cokemaking (58 FR 57898, October 1993) and steel finishing with chromium electroplating and chromium anodizing (60 FR 4948, January 1995).

For the cokemaking subcategory, EPA proposed maximum achievable control technology (MACT) standards on July 3, 2001 (66 FR 35326) for pushing, quenching, and battery stacks at cokemaking plants. These regulations are currently scheduled for promulgation in December 2002. Like effluent limitations guidelines and standards, MACT standards are technology-based. The Clean Air Act sets maximum control requirements on which MACT standards can be based for new and existing sources. By-product recovery operations in the cokemaking subcategory remove the majority of HAPs through processes that collect tar, heavy and light oils, ammonium sulfate, and elemental sulfur. Ammonia removed by steam stripping, also referred to as free and fixed ammonia distillation, could generate a potential air quality issue if uncontrolled; however, ammonia stripping operations at cokemaking facilities capture vapors and convert ammonia to either an inorganic salt or anhydrous ammonia, or destroy the ammonia. Ammonia stripping also removes cyanide, phenols, and other volatile organic compounds (VOCs) typically found in cokemaking wastewater. The VOCs that are not destroyed during the stripping process remain in the liquid ammonia still wastewater effluent stream for subsequent biological treatment.

Biological treatment of cokemaking wastewater can potentially emit HAPs if significant concentrations of volatile organic compounds (VOCs) are present. To estimate the maximum air emissions from biological treatment, EPA multiplied the individual concentrations of VOCs in cokemaking wastewater entering the biological treatment system by the maximum design flow (2.52 million gallons per day) and the maximum operational period (365 days/year) reported in the U.S. EPA Collection of 1997 Iron and Steel Industry Data, and then summed the emissions for all VOCs. The Agency determined the concentrations of the individual VOCs entering the biological treatment systems, which include benzene, acetone, acrylonitrile, carbon disulfide, and 1,1,2,2-TCA, from EPA sampling data. Using the conservative assumption that all of the VOCs entering the biological treatment system are emitted to the atmosphere (no biological degradation), the maximum VOC emission rate would be approximately 1,800 pounds or 0.9 tons per year. (EPA can not disclose the concentrations or loadings for individual pollutants because it would disclose confidential business information.) EPA believes that this is an overestimate because VOCs can be degraded through biological treatment. EPA concludes that, even if this likely overestimate of VOC emission rate were accurate, it is well below threshold levels that would classify the site as a major source of VOCs (i.e., 25 tons for the combination of all HAPs, or 10 tons for any individual HAP). Therefore, EPA's estimate would be an acceptable rate of emissions that would not have a significant impact on the environment.

EPA did not identify any volatile pollutants of concern and identified 11 semivolatile pollutants of concern in untreated sintering wastewater. The incremental technology basis for the sintering segment beyond the 1982 rule includes only multimedia filtration to remove chlorinated dioxin and furan congeners from sintering wastewater. EPA estimates no incremental air emissions for sintering operations.

EPA did not identify any volatile or semivolatile pollutants of concern in untreated blast furnace wastewater, integrated and stand-alone hot forming wastewater, or other operations wastewater. Therefore, EPA estimates no incremental air emissions for the technology options evaluated for these subcategories for the final rule.

For the steel finishing subcategory, EPA identified several volatile and semivolatile priority and nonconventional organic pollutants of concern in untreated wastewater in both the carbon and alloy and stainless segments. The volatile organic pollutants of concern for the carbon and alloy segment are 1,1,1-trichloroethane and 2-propanone and the semivolatile priority organic pollutants are bis(2-ethylhexyl)phthalate, alpha-terpineol, benzoic acid, n-dodecane, n-eicosane, n-hexadecane, n-octadecane, and n-tetradecane. For the stainless segment, the volatile organic pollutants of concern are ethylbenzene, toluene, m-xylene, o- + p-xylene, and 2-propanone. The semivolatile priority organic pollutants are naphthalene, phenol, 2,6-di-tert-butyl-p-benzoquinone, hexanoic acid, 2-methylnaphthalene, n-docosane, n-dodecane, n-eicosane, n-hexadecane, n-octadecane, n-tetracosane, and n-tetradecane. EPA estimated that sites in the proposed steel finishing subcategory would install only countercurrent rinse tanks to achieve the limitations considered by the Agency for the final rule. EPA estimated that these additional rinse tanks would not significantly impact air emissions for steel finishing operations beyond the current levels of emissions. EPA did not revise limitations and standards for the steel finishing subcategory.

For the integrated and non-integrated steelmaking subcategories, the only organic pollutant of concern detected in untreated BOF wastewater was phenol from stainless steel product manufacturing. Phenol was detected at relatively low concentrations (0.012 mg/L to 0.33 mg/L). Because phenol is a semivolatile organic compound with a low Henry's Law constant, it is not expected to partition to the air. No volatile pollutants of concern were detected in any steelmaking wastewater sample. The other primary pollutants in the steelmaking process wastewater are suspended solids, dissolved metals, and oils. Under ambient conditions, these pollutants show insignificant volatilization because of their vapor pressure, even in open-top treatment units. EPA did not revise limitations and standards for the integrated and non-integrated steelmaking subcategories.

Wet air pollution control (WAPC) equipment is commonly used by facilities in a number of iron and steel subcategories to control air emissions. None of the pollution prevention, recycling, or wastewater technology options will have a negative impact on the performance of these WAPC systems. In fact, some of the proposed pollution prevention alternatives considered by EPA for the final rule may enhance the performance of these systems by reducing pollutant loadings. Therefore, EPA does not expect any adverse air impacts to occur as a result of the final regulation.

15.3 Solid Waste Impacts

A number of the final treatment technologies that comprise the technology basis for the final rule will generate solid waste, including Resource Conservation and Recovery Act (RCRA) hazardous and nonhazardous sludge and waste oil. Most solid waste generated by the iron and steel industry is nonhazardous, except for certain treatment sludges generated by electroplating operations in the steel finishing industry and iron-cyanide sludge generated during treatment of cokemaking wastewater. Nonhazardous solid wastes include sludge from biological treatment of cokemaking wastewater and sludge from multimedia filtration, chemical precipitation, and clarification of iron and steelmaking wastewater. Federal and state regulations require iron and steel facilities to manage their RCRA hazardous and nonhazardous sludges to prevent releases to the environment.

The following subsections provide both current sludge generation rates estimated from the industry surveys and the incremental increases estimated for option considered for each iron and steel subcategory for this final rule. Incremental increases in sludge generation are based on the pollutant loading and removal information provided in Section 11. Based on the information summarized in Table 15-1, EPA estimates that annual sludge generation for all subcategories affected by the final rule will increase by 0.2 percent.

15.3.1 Cokemaking Subcategory

Biological treatment with nitrification followed by clarification, which is the primary technology basis for removal of ammonia, phenolics, and biochemical oxygen demand (BOD) from cokemaking wastewater will generate wastewater treatment sludge requiring disposal or further processing. Table 15-3 shows additional sludge generation for all cokemaking facilities for each of the technology options considered for the final rule.

EPA selected options BAT-1 and PSES-1 for the final rule for direct and indirect dischargers, respectively. EPA estimates that compliance with BAT-1 will generate approximately 150 tons (dry) per year of additional sludge and PSES-1 will generate an additional 40 tons (dry) per year (Table 15-3). The additional sludge generation for the BAT-1 option is due to incremental ammonia removal via biological treatment, while the additional sludge generation for PSES-1 is due to incremental ammonia removal via biological treatment at sites that already operate biological treatment systems. Based on industry survey data, EPA estimates that the cokemaking industry currently generates more than 53,000 tons per year (dry) of sludge. As such, the increased sludge generated by the BAT-1 and PSES-1 treatment options is approximately 0.4 percent of the total sludge currently generated by the industry (Table 15-1).

BAT-3, which was rejected as the technology basis for this final rule, generates a greater amount of additional sludge than BAT-1 (410 tons per year (dry)) due to the removal of total suspended solids (TSS) by the multimedia filters following biological treatment. The Agency expects approximately 130 additional tons of sludge per year (dry) would be generated for PSES-3. The incremental sludge generation is due to the addition of biological treatment to the PSES-1 technology basis.

Neither of the two non-recovery cokemaking facilities generate wastewater and, therefore, these facilities are not expected to generate additional sludge.

15.3.2 Ironmaking Subcategory

EPA did not revise limitations or standards for this subcategory so there is no additional sludge generation for this subcategory. The following discussion is based on the options EPA considered for the proposed ironmaking and sintering segments, but ultimately rejected, for the final rule.

Ironmaking operations would generate additional wastewater treatment sludge as a result of complying with both BAT-1 and PSES-1. BAT-1, which includes such sludge generating treatment technologies as solids removal in the high-rate recycle system, clarification, chemical precipitation, and multimedia filtration, would generate approximately 5,870 additional tons/year (dry) of wastewater treatment sludge, as shown in Table 15-3. PSES-1, which includes the same solids-generating treatment units as BAT-1 with the exception of multimedia filtration, would generate an additional 40 tons per year (dry) of wastewater treatment sludge.

Industry survey estimates show that ironmaking operations generated approximately 236,000 tons (dry) of mill scale, grit, and sludge in 1997. The BAT-1 and PSES-1 options for ironmaking would increase annual sludge generation by 5,910 tons/year, an increase of approximately 2.5 percent.

15.3.3 Sintering Subcategory

As shown in Tables 15-1 and 15-3, EPA estimates that compliance with the selected technology option will generate approximately 84 tons (dry) per year of additional sludge. The additional sludge generation is due to multimedia filtration and chemical precipitation. Based on the industry survey data, EPA estimates that the sintering industry currently generates more than 100,000 tons per year (dry) of sludge. Therefore, the incremental sludge generation represents a 0.1-percent increase in sludge generation.

15.3.4 Integrated Steelmaking Subcategory

EPA did not revise limitations or standards for this subcategory so there is no additional sludge generation for this subcategory. The following discussion is based on the options EPA considered, but ultimately rejected, for the final rule.

To comply with BAT-1, EPA estimates an additional 2,950 tons/year (dry) of wastewater treatment sludge would be generated due to solids removal in the high-rate recycle systems, clarification, multimedia filtration, and chemical precipitation (Table 15-3). Indirect discharging integrated steelmaking facilities have the model treatment equipment in place and, therefore, EPA would not expect them to generate additional sludge. Based on industry survey data, integrated steelmaking operations currently generate approximately 740,000 tons/year of mill scale, sludges, and filter cakes. The additional generation of sludge would represent a 0.4-percent increase.

15.3.5 Integrated and Stand-Alone Hot Forming Subcategory

EPA did not revise limitations or standards for this subcategory so there is no additional sludge generation for this subcategory. The following discussion is based on the options EPA considered, but ultimately rejected, for the final rule.

The Agency estimates an additional 20,000 tons/year (dry) of sludge would be generated to comply with BAT-1 due to solids removal in high-rate recycle systems, clarification, and multimedia filtration (Table 15-3). EPA estimates that, to comply with PSES-1, indirect dischargers would generate an additional 20 tons/year of sludge due to multimedia filtration. Incremental sludge production is estimated to be a 6.1-percent increase over the current annual sludge production of 326,000 tons/year, as reported in industry survey data.

15.3.6 Non-Integrated Steelmaking and Hot Forming Subcategory

EPA did not revise limitations or standards for this subcategory so there is no additional sludge generation for this subcategory. The following discussion is based on the options EPA considered, but ultimately rejected, for the final rule.

To comply with BAT-1 and PSES-1 for the non-integrated steelmaking and hot forming subcategory, the Agency estimates an additional 1,400 tons/year (dry) of sludge for BAT-1 and 10 tons/year for PSES-1 would be generated due to solids removal in high-rate recycle systems, clarification, and multimedia filtration (Table 15-3). Treatment sludges from BAT-1 and PSES-1 would increase solid waste production by approximately 0.1 percent over the current 1,275,000 tons per year, as reported in industry survey data.

15.3.7 Steel Finishing Subcategory

EPA did not revise limitations or standards for this subcategory so there is no additional sludge generation for this subcategory. The following discussion is based on the options EPA considered, but ultimately rejected, for the final rule.

Steel finishing facilities generate both RCRA hazardous and nonhazardous sludges. RCRA sludge may be classified as hazardous as a result of listing or characterization based on the following information:

- If the site performs electroplating operations, the sludge resulting from treatment of this wastewater is a RCRA F006 listed hazardous waste (40 CFR 260.11). If wastewater from other operations is mixed with the electroplating wastewater and treated, all sludges generated from the treatment of the combined wastewater are also RCRA F006 listed hazardous wastes.

- Sludge generated from the treatment of wastewater associated with tin plating on carbon steel and zinc plating on carbon steel is not a RCRA listed hazardous waste.

- If the sludge from wastewater treatment exceeds the standards for the Toxicity Characteristic Leaching Procedure (i.e., is hazardous), or exhibits other RCRA-defined hazardous characteristics (i.e., is reactive, corrosive, or flammable), it is considered a characteristic hazardous waste (40 CFR 261.24).

Based on information collected during site visits and sampling episodes to iron and steel operations, the Agency believes that the majority of sludge generated by steel finishing sites would not be classified as hazardous. Information provided in the industry surveys indicates that less than 5 percent of the total sludges and solid waste generated by finishing facilities is hazardous under RCRA.

For carbon and alloy and stainless steel finishing sites, BAT-1 and PSES-1 consist of in-process controls to limit water usage and recycle process chemicals, plus end-of-pipe wastewater treatment. Wastewater treatment includes oil removal, hexavalent chromium reduction, hydraulic and waste loading equalization, metals precipitation, clarification, and sludge dewatering. EPA estimates that direct dischargers (both carbon and alloy and stainless steel) installing and modifying these treatment systems would generate approximately 2,150 tons/year (dry) of additional treatment sludge (Table 15-3). EPA estimates that indirect dischargers would generate an additional 30 tons/year of wastewater treatment sludge. Industry survey data indicate that finishing facilities currently generate over 790,000 tons per year (dry) of sludge. The BAT-1 and PSES-1 options for steel finishing would increase annual sludge generation by approximately 0.3 percent.

15.3.8 Other Operations Subcategory

The Agency estimates the other operations subcategory will generate an additional 3 tons/year (dry) of sludge to comply with the BPT effluent limits due to multimedia filtration (Table 15-3). Treatment sludges from BPT will increase solid waste production by approximately 0.1 percent over the current 2,500 tons/year, as shown in Table 15-1.

15.3.9 Solid Waste Impacts Summary

Based on information provided in the industry surveys, the iron and steel industry currently generates approximately 3,522,500 tons/year of solid waste. EPA estimates that compliance with the new or revised limitations in this final rule will result in a net increase in sludge generation of 277 tons/year for the entire industry, or approximately 0.007 percent.

15.4 References

15-1 Perry's Chemical Engineers Handbook, Sixth Edition. McGraw Hill Press, 1984.

15-2 Energy Information Administration. Electric Power Annual 1998 Volume I, Table A1.

Table 15-1

Summary of Current and Incremental Energy Requirements and Sludge Generation by Subcategory

Energy Usage and Sludge Generation	Subcategory			
	Cokemaking	**Sintering**	**Other**	**Total**
Selected options	BAT-1 PSES-1	BAT-1	BPT	
Current energy usage (a) (million kilowatt hours/year)	104	17	8	129
Incremental energy usage (million kilowatt hours/year)	17	4	0.01	21
% increase in energy requirement	16	24	0.1	16
Current sludge generation (a) (tons/year)	53,000	100,000	2,500	160,000
Incremental sludge generation (tons/year)	190	84	3	277
% increase in sludge generation	0.4	0.1	0.1	0.2

(a) U.S. EPA, U.S. EPA Collection of 1997 Iron and Steel Industry Survey (Detailed and Short Surveys).

Table 15-2

Incremental Energy Requirements by Subcategory and Option

Subcategory	Incremental Energy Required (million kWh/year)			
	BAT-1	**BAT-3**	**PSES-1**	**PSES-3**
Cokemaking	16	24	1	16
Ironmaking	18	NA	0	NA
Sintering	4	NA	NA	NA
Integrated Steelmaking	12	NA	0	NA
Integrated and Stand-Alone Hot Forming (a)	214	NA	0.04	NA
Non-Integrated Steelmaking and Hot Forming (a)	33	NA	0.5	NA
Steel Finishing (a)	5	NA	0.1	NA
Other	0.01 (b)	NA	NA	NA

(a) Includes carbon, alloy, and stainless steel products.
(b) Based on BPT for direct-reduced iron, forging, and briquetting.
NA - Not applicable.

Table 15-3

Incremental Sludge Generation by Subcategory and Option

Subcategory	Incremental Sludge Generation (dry tons/year)			
	BAT-1	**BAT-3**	**PSES-1**	**PSES-3**
Cokemaking	150	410	40	130
Ironmaking	5,870	NA	40	NA
Sintering	84	NA	NA	NA
Integrated Steelmaking	2,950	NA	0	NA
Integrated and Stand-Alone Hot Forming (a)	20,000	NA	20	NA
Non-Integrated Steelmaking and Hot Forming (a)	1,400	NA	10	NA
Steel Finishing (a)	2,150	NA	30	NA
Other	3 (b)	NA	NA	NA

(a) Includes carbon, alloy, and stainless steel products.
(b) BPT for DRI, forging, and briquetting.
NA - Not applicable.

SECTION 16

IMPLEMENTATION OF PART 420 THROUGH THE NPDES AND PRETREATMENT PROGRAMS

This section presents an overview of implementation of Part 420 through the NPDES and pretreatment programs. EPA promulgated the following revisions to Part 420:

- Revised effluent limitations guidelines and standards for by-product cokemaking operations;
- New effluent limitations guidelines and standards for non-recovery cokemaking operations;
- New effluent limitations guidelines and standards for 2,3,7,8-TCDF for sintering operations with wet air pollution control systems;
- New effluent limitations guidelines and standards for sintering operations with dry air pollution control systems;
- Ammonia (as N) waivers for cokemaking, sintering, and ironmaking facilities that discharge to POTWs with nitrification capability;
- New alternative effluent limitations guidelines and standards for semi-wet basic oxygen furnace (BOF) operations;
- New limitations for electric arc furnaces with semi-wet air pollution control; and
- New effluent limitations guidelines and standards for direct-reduced iron, briquetting, and forging operations.

EPA deleted obsolete effluent limitations guidelines and standards for beehive cokemaking, ferromanganese blast furnace, and open heart steelmaking operations. EPA also revised the applicability of the total recoverable chloride limitations for sintering operations with wet air pollution control systems. The revised regulation also contains changes to the water bubble rule and certain other changes affecting implementation through the NPDES and pretreatment programs, as described later in this section.

Since permit writers, control authorities, and iron and steel facilities have been implementing the existing rule, which is largely retained in the revised Part 420 promulgated today, the focus of this section is primarily the implementation of the revisions to Part 420. EPA will also publish a guidance manual that will provide additional examples of applying Part 420 and examples of applying best professional judgment and best management practices.

New and reissued Federal and State NPDES permits to direct dischargers must include the effluent limitations promulgated today. The permits must require immediate compliance with such limitations. If the permitting authority wishes to provide a compliance schedule, it must do so through an enforcement mechanism. Existing indirect dischargers must comply with today's pretreatment standards no later than three years after the publication date of the rule. New direct and indirect discharging sources must comply with applicable limitations and standards on the date the new sources begin operations. New direct and indirect sources are those that began construction of iron and steel operations affected by today's rule after 30 days after publication date of the rule. See 65 FR at 82027.

This section is organized as follows:

- Section 16.1 - Applicability of the revised Part 420;
- Section 16.2 - Changes in subcategorization structure and applicability;
- Section 16.3 - Subcategory-specific process wastewater sources;
- Section 16.4 - Calculating NPDES permit and pretreatment effluent limitations;
- Section 16.5 - Application of best professional judgment;
- Section 16.6 - Water bubble;
- Section 16.7 - Ammonia waiver;
- Section 16.8 - Compliance monitoring;
- Section 16.9 - NPDES permit and pretreatment variances and exclusions; and
- Section 16.10 - References.

16.1 Applicability of the Revised Part 420

Section 420.01 presents the applicability of the revised Part 420. The revised regulation is subcategorized as listed below and applies to facilities that manufacture metallurgical coke (furnace coke and foundry coke); sinter; iron; steel and semi-finished steel products, including hot and cold finished flat-rolled carbon and alloy and stainless steels; flat-rolled and other steel shapes hot coated with other metals or combinations of metals; plates; structural shapes and members; and hot rolled pipes and tubes.

Subcategory	Facilities
A Cokemaking	By-product recovery coke plants Non-recovery coke plants
B Sintering	Sinter plants
C Ironmaking	Ironmaking blast furnaces
D Steelmaking	Basic oxygen furnaces Electric arc furnaces
E Vacuum Degassing	Vacuum degassing plants
F Continuous Casting	Continuing casting operations
G Hot Forming	Primary mills Section mills Hot strip and plate mills Pipe and tube mills
H Salt Bath Descaling	Oxidizing operations Reducing operations
I Acid Pickling	Sulfuric acid Hydrochloric acid Combination acid pickling
J Cold Forming	Cold rolling mills Cold worked pipe and tube mills
K Alkaline Cleaning	Batch and continuous operations
L Hot Coating	Galvanizing Galvalume Other hot dip coatings
M Other Operations	Direct-reduced iron Forging Briquetting

EPA deleted certain manufacturing processes that had been included in the prior Part 420 (promulgated in 1982 and revised in 1984) from this regulation because they are no longer used in the United States:

- Beehive cokemaking;
- Ferromanganese blast furnaces; and
- Open hearth steelmaking furnaces.

EPA is also considering revising the applicability of Parts 420 and 433 (Metal Finishing) to move certain steel finishing operations from these parts to Part 438 (Metal Products & Machinery). EPA is examining this in the context of its Part 438 rulemaking. The steel finishing operations in Part 420 that could be affected are:

- Surface finishing and cold forming of steel bar, rod, wire, pipe or tube;
- Batch electroplating on steel;
- Continuous electroplating and hot dip coating of long steel products (e.g., wire, rod, bar);
- Batch hot dip coating of steel; and
- Steel wire drawing.

These operations produce finished products such as bars, wire, pipe and tubes, nails, chain link fencing, and steel rope.

The steel finishing operations in Part 433 that could be affected by the Part 438 rulemaking include continuous electroplating of flat steel products (e.g., sheet, strip, and plate). EPA had proposed to move these electroplating operations to Part 420 but did not promulgate this revised applicability for the reasons described in Section V.A.7 of the preamble for the final rule.

16.2 Changes in Subcategorization Structure and Applicability

Table 16-1 compares the previous subcategorization of Part 420 to the revised subcategorization of Part 420 based on this final rule. For the most part, EPA kept the same subcategorization from the 1982 regulation in the revised regulation. The revisions to the final rule by subcategory are listed below:

<u>Subcategory A - Cokemaking</u>

- Deletes beehive coke plants because that cokemaking technology is not used in the United States.
- For BPT and BCT effluent limitations guidelines, maintains the 1982 subcategorization that distinguished between merchant and iron and steel by-product recovery coke plants because EPA did not change those effluent limitations. Adds non-recovery cokemaking as a new segment at BPT and BCT to account for that cokemaking technology.
- For BAT, NSPS, PSES and PSNS, establishes new segments for by-product recovery and non-recovery cokemaking. Based on review of information from the 1997 survey, site visits, and EPA sampling episodes, EPA determined that it is not appropriate to establish or maintain different segments for merchant and iron and steel by-product recovery coke plants.

Subcategory B - Sintering

- Adds segments to distinguish sintering operations with wet air pollution control systems and sintering operations with dry air pollution control systems.

Subcategory C - Ironmaking

- Deletes ferromanganese blast furnace operations because ferromanganese is no longer produced in blast furnaces in the Unites States.

Subcategory D - Steelmaking

- Deletes open hearth steelmaking operations because that steelmaking technology is no longer used in the United States.

Subcategory H - Salt Bath Descaling, Subcategory I - Acid Pickling, Subcategory J - Cold Rolling, and Subcategory L - Hot Coating

- EPA is considering deleting segments designated in Table 16-1 by *italics* from Part 420 and transferring them for regulation under Part 438 (Metal Products and Machinery) as part of that rulemaking.

Subcategory M - Other Operations

- Adds a new subcategory and segments for direct-reduced iron, steel forging, and briquetting operations.

16.3 Subcategory-Specific Process Wastewater Sources

Part 420 regulates discharges of process wastewaters generated in all production operations covered in the general and subcategory-specific applicability sections of the regulation. EPA defines process wastewater at 40 CFR Part 122.2 as follows:

> "... any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct or waste product."

As described below, permit writers and control authorities apply the effluent limitations guidelines and standards in Part 420 on a mass basis using a *reasonable measure of actual production* for the facilities being permitted. There are circumstances where facilities may appropriately cotreat non-process wastewaters generated from ancillary operations with process wastewaters. To accommodate such circumstances, EPA defined *non-process wastewaters* at §420.02(r) as:

> "... utility wastewaters (for example, water treatment residuals, boiler blowdown, and air pollution control wastewaters from heat recovery equipment); treated or untreated ground waters from groundwater remediation systems; dewatering water from building foundations; and, other wastewaters not associated with a production process."

§420.08 authorizes NPDES and pretreatment permit authorities to provide additional mass discharge allowances for non-process wastewaters when such wastewaters are appropriately cotreated with process wastewaters. EPA will publish a separate guidance document that includes examples of appropriate cotreatment of process and non-process wastewaters.

Table 16-2 lists process and non-process wastewaters generated from manufacturing and processing operations at facilities regulated by Part 420; it is not intended to be an exhaustive list. Although not repeated in Table 16-2 for each subcategory, process wastewaters that may be common to many manufacturing operations include equipment cleaning and wash down waters. Common non-process wastewaters may include process water treatment residuals, boiler blowdown, and storm water from the immediate process area. The presence of these wastewaters and the need to cotreat them with process wastewaters is dependent on the configuration of the individual steel mill.

16.4 Calculating NPDES Permit and Pretreatment Effluent Limitations

This section discusses the production basis of the effluent limitations and provides examples for calculating NPDES and pretreatment permit limits where process wastewater discharges from the same operation and same category are cotreated, where wastewater discharges from operations in different subcategories are cotreated, and where there are miscellaneous process wastewater discharges.

16.4.1 Production Basis

The limitations and standards promulgated today are expressed in terms of mass (e.g., lbs/day or kg/day). This means that NPDES permit limitations derived from today's rule similarly must be expressed in terms of mass. See 40 CFR 122.45(f). These requirements are for direct discharging facilities. Similar requirements exist for indirect discharging facilities and are found in 40 CFR 403.6(c)(3). In order to convert effluent limitations guidelines and standards expressed as pounds/thousand pounds to a monthly average or daily maximum permit limit, the permitting authority would use a production rate with units of thousand pounds/day. EPA's regulations at 40 CFR 420.04, 122.45(b)(2), and 403.6(c)(3) require that NPDES permit and pretreatment limits be based on a "reasonable measure of actual production," but do not define the term. In its 2000 proposal, EPA solicited comment on whether to codify a definition of that term in Part 420 for the iron and steel category. After considering the comments and reviewing the rulemaking record, EPA has decided not to codify a definition of "reasonable measure of actual production."

Background

As explained above, the current iron and steel regulation does not define what constitutes a "reasonable measure of actual production," although it offers the following examples: "production during the high month of the previous year, or the monthly average for the highest of the previous five years." See 40 CFR 420.04.

EPA believes that some NPDES permitting and pretreatment control authorities have identified production rates that do not reflect a "reasonable measure of actual production" specified at 122.45(b)(2)(I), 403.6(c)(3), and 420.04. In some cases, maximum production rates for similar process units discharging to one treatment system were determined from different years or months, which may provide an unrealistically high measure of actual production. In EPA's view, this would occur if the different process units could not reasonably produce at these high rates simultaneously.

In addition, industry stakeholders have also noted that permitting and pretreatment control authorities interpret the reasonable measure of actual production inconsistently. Accordingly, iron and steel industry stakeholders requested that EPA publish a consistent policy on how to implement this requirement. Industry stakeholders have indicated that (1) in order to promote consistency, EPA should codify the method used to determine appropriate production rates for calculating allowable mass loadings, so that the permit writers can all use the same basis; and (2) EPA should use a high production basis, such as maximum monthly production over the previous five year period or maximum design production, in order to ensure that a facility will not be out of compliance during periods of high production.

2000 Proposal

Because the "reasonable measure of actual production" concept is inconsistently applied, EPA proposed in 2000 to include in its final iron and steel rulemaking specific direction on making this determination. EPA solicited comment on four alternative approaches to implement the "reasonable measure of actual production." See 65 FR at 82,029-31. Each alternative excluded, from the calculation of operating rates, production from unit operations that do not generate or discharge process wastewater. EPA proposed the following four alternative definitions of reasonable measure of actual production: (A) include production only from units that can operate simultaneously; (B) apply multi-tiered permit limits with different limits for different rates of production as defined in Chapter 5 of U.S. EPA NPDES Permit Writers Manual, EPA 833-B-96-003; (C) use the average daily production from the highest production year during the previous five years; and (D) use one of the methods for monthly average limits but use concentration limits for daily maximum limits.

Each alternative had its supporters and detractors in comments. Several commenters preferred alternative A, but incorrectly described the alternative as the high month of production over the past five years. No commenters provided data that showed they would be unable to meet the proposed limits and standards under any of the four alternatives.

Final Rule

At this time, EPA has decided not to revise Section 420.04 in any respect. EPA has also decided not to codify a definition for the term "reasonable measure of actual production" applicable to Part 420. The Agency has thoroughly evaluated all comments supporting other interpretations and is not convinced that departing from past practices is justified here. Consequently, EPA concludes that continuing to allow flexibility to permitting and pretreatment control authorities to apply site-specific factors in determining a reasonable measure of production is appropriate.

16.4.2 Calculating NPDES Permit and Pretreatment Limitations

When promulgating Part 420 in 1982, EPA recognized that cotreating compatible wastewaters in the iron and steel industry is a cost-effective means of wastewater treatment. For this revised rule, EPA carried forward the structure of the 1982 regulation to facilitate cotreatment of compatible wastestreams in centralized treatment systems and to discourage cotreatment of wastestreams that the Agency deems incompatible (e.g., cotreating by-product recovery cokemaking and BOF steelmaking wastewaters, which could increase discharges of toxic pollutants from cokemaking operations). The following table presents groups of subcategories for which the regulation is structured to facilitate cotreatment.

<table>
<tr><td>Group 1</td><td colspan="3">Cokemaking</td></tr>
<tr><td rowspan="2">Group 2</td><td rowspan="2">Ironmaking</td><td colspan="2">Sintering</td></tr>
<tr><td colspan="2">Blast furnaces</td></tr>
<tr><td rowspan="5">Group 3</td><td rowspan="5">Carbon Steel</td><td rowspan="3">Steelmaking</td><td>BOF steelmaking</td></tr>
<tr><td>Vacuum degassing</td></tr>
<tr><td>Continuous casting</td></tr>
<tr><td colspan="2">Hot forming</td></tr>
<tr><td colspan="2">Steel finishing</td></tr>
<tr><td rowspan="5">Group 4</td><td rowspan="5">Stainless Steel</td><td rowspan="3">Steelmaking</td><td>BOF steelmaking</td></tr>
<tr><td>Vacuum degassing</td></tr>
<tr><td>Continuous casting</td></tr>
<tr><td colspan="2">Hot forming</td></tr>
<tr><td colspan="2">Steel finishing</td></tr>
</table>

The Agency selected pollutants for regulation in each of these groups to allow facilities to cotreat their wastestreams where feasible.

The NPDES permit regulations at §122.45(h) provide that where it is not feasible to impose effluent limitations at a final outfall discharging to a receiving water, the permit writer may elect to impose the technology-based effluent limitations at an internal outfall or compliance monitoring station. This is commonly done in NPDES permits for integrated steel mills where treated process wastewater effluents are commingled with noncontact cooling waters and storm waters prior to discharge to a receiving stream through a final outfall.

The remainder of this subsection provides two examples of how to calculate NPDES permit and pretreatment effluent limitations for various combinations of iron and steel manufacturing facilities. Permit writers and control authorities commonly calculate NPDES permit and pretreatment effluent limitations from Part 420 using spreadsheets developed for specific permitted final outfalls or wastewater treatment facilities limited at an internal monitoring station. For example, Table 16-3 is an example spreadsheet that corresponds to Example 1. The spreadsheet shows the daily maximum and monthly average mass loadings for each process, calculated for each regulated pollutant. The resulting mass loadings for each process are summed for each pollutant to determine the respective effluent limitations for the pertinent outfall or wastewater treatment system.

Direct Dischargers

Example 1: Two iron and steel processes within the same category; no nonregulated process wastewater.

In this example, a facility has two blast furnaces and treats their process wastewater in a dedicated blast furnace gas cleaning water treatment and recycle system. The reasonable measure of actual production (NPDES permit production rate) is 4,500 tons/day for one furnace and 3,900 tons/day for the other. The facility also has a sinter plant with wet air pollution controls equipped with a dedicated treatment and recycle system. The facility discharges blowdown from that recycle system into the blast furnace treatment and recycle system; the only discharge from these operations is the blowdown from the blast furnace treatment and recycle system. The NPDES production rate for the sinter plant is 4,100 tons/day.

Table 16-3 presents the calculations illustrating how the effluent limitations guidelines are applied in this case. For this example, the total suspended solids (TSS) and oil and grease (O&G) limitations reflect the BPT limitations from the 1982 regulation. Note that the 2,3,7,8-tetrachlorodibenzofuran (TCDF) limitation applicable to sinter plant wastewater is applied to the combined wastewater discharge from the sinter plant and blast furnaces as a daily maximum concentration limit less than the defined *minimum level* of 10 parts per quadrillion (ppq).[1]

[1]Direct dischargers must demonstrate compliance with the effluent limitations and standards for 2,3,7,8-TCDF at the point after treatment of sinter plant wastewater separately or in combination with blast furnace wastewater, but prior to mixing with any other process or non-process wastewaters or noncontact cooling waters in amounts greater than five percent of the sintering process wastewater flow. See §420.29.

Indirect Dischargers

40 CFR Part 403 classifies wastewater that can be discharged from industrial facilities to POTWs as follows:

- *Regulated* - Wastewater regulated by categorical pretreatment standards, such as those contained in Part 420;

- *Unregulated* - Wastewater that is not regulated by categorical pretreatment standards and is not *dilute* wastewater; and

- *Dilute* - Sanitary wastewater, noncontact cooling water, boiler blowdown, and other wastestreams listed in Appendix D to Part 403.

For indirect iron and steel dischargers whose wastestreams are not cotreated with wastewater from other industrial categories, the control authority would derive mass-based pretreatment limits from the final pretreatment standards similarly to how NPDES permit writers derive limits for direct dischargers. Specifically, the pretreatment authority would apply the pretreatment limits either at the point of discharge from the facility's wastewater treatment facility or at the point of discharge to the POTW, whichever point the control authority determines is appropriate based on site circumstances.

Where the above circumstances apply, and where there are other wastestreams present that would be regulated under the Part 420, the pretreatment authority would calculate the applicable pretreatment limits as described in Example 2. In this case, the pretreatment authority would add incremental mass limits for these wastestreams, as allowed by §420.08, to the limits derived for the regulated wastewater to determine the appropriate pretreatment limits.

Where facilities combine wastewaters regulated under Part 420 and dilute wastewaters, the pretreatment authority can either: (1) apply the pretreatment limits at an internal monitoring point where dilution is not a factor, under authority of §403.6(e)(2) and (4); or, (2) apply mass-based pretreatment limits in terms at a location after the regulated and dilute wastestreams are combined, provided the dilution is not enough to interfere with compliance determinations.

Where facilities cotreat their iron and steel wastewaters with wastewaters from other industrial categories that are regulated by other categorical pretreatment standards, the pretreatment authority can either derive pretreatment standards for the combined wastestreams by using a building-block approach or by using the "combined wastestream formula" provided at §403.6(e) (see Equation 16-1). In most circumstances, pretreatment authorities use a building block approach where mass pretreatment limits are derived from each regulation and added together to develop a mass pretreatment limit for the combined wastewaters.

$$C_T = \frac{\sum C_I F_I}{\sum F_I} \times \frac{F_T - F_D}{F_T} \qquad (16\text{-}1)$$

where:

C_T = The alternate concentration limit for the combined wastestream, mg/L;

C_I = The categorical pretreatment standard concentration limit for a pollutant in the regulated stream I, mg/L;

F_I = The average daily flow of stream I, L/day;

F_D = The average daily flow from dilute wastestreams as defined in Part 403, L/day; and

F_T = The total daily flow, L/day.

See Reference 16-1 for more information on the combined wastestream formula.

As with direct dischargers, when the pretreatment standards applicable to one category regulate a different set of pollutants than the standards applicable to another category, the control authority must ensure that the guidelines are properly applied. If a pollutant is regulated in one wastestream but not another, the control authority must ensure that the nonregulated pollutant stream does not dilute the regulated pollutant stream to the point where pollutants are not analytically detectable. If this level of dilution occurs, the control authority most likely would establish internal monitoring points, as authorized under 40 CFR Part 403.6(e)(2) and (4). Alternatively, if there is reason to believe the pollutant in question is present in the unregulated wastestream at some level, the pretreatment authority may derive supplemental mass limitations for the pollutant in question in the unregulated wastestream using best professional judgment (BPJ).

Example 2 describes how to calculate pretreatment limits for an indirect discharging by-product recovery coke plant where process area storm water and groundwater remediation flow are cotreated with regulated coke plant process wastewaters. In this case, the permit writer would use a process area storm water flow allowance and a long-term average groundwater flow rate to develop supplemental mass effluent limitations based on concentrations used by EPA to develop the by-product recovery coke plant pretreatment standards. Those supplemental mass effluent limitations are added to the categorical effluent limitations to establish the final pretreatment limits applicable to the combined wastewaters. Permit writers and control authorities would use this same approach for both direct and indirect dischargers where compatible non-process wastewaters are present and are cotreated with process wastewaters.

Example 2: Indirectly discharging coke plant;
cotreatment of ground water from remediation project.

In this example, an indirect discharging by-product recovery coke plant has an active ground water remediation project that generates a continuous flow of 35 gpm; this wastestream contains benzene, phenol, ammonia as nitrogen, and other pollutants characteristic of coke plant wastewater. Because the untreated ground water is compatible with untreated coke plant process wastewater, EPA determined that it is appropriate to cotreat these two waste streams. In this example, benzene in the ground water would be removed in the ammonia still and returned to the coke oven gas; ammonia would be removed in the ammonia still and downstream treatment; and phenol would be removed either at the coke plant (depending upon the type of treatment provided) or at the POTW. The Agency has determined that phenol is compatible with biological treatment at POTWs and does not pass through.

The coke plant is equipped with process area secondary containment for the by-product recovery area and for the following bulk storage tanks: ammonia liquor, crude coal tar, crude light oil, and untreated wastewater equalization tanks. The facility has the capability to temporarily store a portion of the collected storm water in secondary containment structures and control the rate storm water is pumped to the wastewater treatment system equalization tanks. Based on review of historical daily coke plant wastewater treatment flow monitoring records and daily plant rainfall data, the daily effluent flow was found to increase approximately 5 gpm for one to two days following storm events ranging from 1.0" to 2" per 24 hours. Consequently a process area storm water allowance of 5 gpm was included in the derivation of the pretreatment limitations. Table 16-4 presents the calculations illustrating how the limitations are applied in this case.

The approach used in this example has the same effect as applying the combined wastestream formula from the pretreatment regulations reviewed above; however, the final rule allows both direct and indirect dischargers to treat combinations of regulated and unregulated wastestreams.

16.5 Application of Best Professional Judgement

Section 402(a)(1) of the Clean Water Act (CWA) and the NPDES permit regulations at §122.44(a) and §125.3 allow permit authorities to use BPJ in the absence of categorical effluent limitations to establish NPDES permit limitations. When developing the iron and steel regulation, EPA attempted to minimize the need for BPJ determinations by taking into account process wastewaters commonly generated at each manufacturing process and miscellaneous process-related wastewaters (e.g., those generated in roll shops and from building basement sumps). The Agency recognizes, however, that some sites may generate non-process wastewaters that meet the definition of process wastewater (see §122.2) that were not accounted for in the development of the effluent limitations guidelines and pretreatment standards for existing sources. To assist permit writers in addressing such wastewaters and to minimize the number of requests for fundamentally different factors variances, EPA added a definition of non-process wastewaters at §420.02(r) and included at §420.08 a provision that authorizes permit writers to provide for increased loadings for wastewater sources not included in the development of the regulation, if these sources generate an increased discharge flow.

When developing NPDES and pretreatment limitations, permit writers and pretreatment control authorities are authorized to use their best professional judgment to include increased mass discharge allowances to account for certain non-process wastewaters when they are appropriately cotreated with process wastewaters using best professional judgement. Non-process wastewaters may include utility wastewaters (for example, water treatment residuals, boiler blowdown, and air pollution control wastewaters from heat recovery equipment); treated or untreated wastewaters from groundwater remediation systems; dewatering water for building foundations; and other wastewater streams not associated with a production process. When considering such non-process wastewaters, permit writers and pretreatment control authorities should determine whether they contain process wastewater pollutants, or whether they would simply be dilution flows. For example, wastewater from coke plant groundwater remediation systems would be expected to contain coke plant wastewater pollutants, whereas building foundation dewatering water would be expected to be relatively clean. In the former case, the permit writer or pretreatment control authority may include additional mass discharges based on the average groundwater remediation flow and the concentrations used by EPA to develop the effluent limitations guidelines and standards in developing the mass limits. In the latter case, no increase in mass discharges may be appropriate.

EPA has provided a definition of storm water in the immediate process area at §420.02(t). EPA has included provisions in the regulation at §420.08 for permit writers and pretreatment control authorities to provide for additional mass discharge allowances for process area storm water, when they deem appropriate. With advances in storm water pollution prevention and spill prevention and control, collecting and treating limited amounts of process area storm water with process wastewaters is the most practicable and effective means of limiting discharges of contaminated storm water. This is particularly the case for by-product recovery coke plants, where contaminated storm water is typically collected from the following operations: tar decanters, ammonia liquor storage, crude tar storage, crude light oil recovery (benzol plant), crude light oil storage, ammonia recovery, ammonium sulfate recovery, and others. Storm water collected from these areas often contains oil & grease and some of the nonconventional and toxic pollutants associated with the by-product recovery processes (e.g., ammonia, cyanide, phenolic compounds, and polynuclear aromatic hydrocarbons). As a result, many coke plants commonly collect storm water from these areas and pump it to the process wastewater equalization tank for treatment with process wastewaters. Because the levels of contaminants and dissolved salts in the collected storm water are relatively low compared to those found in process wastewaters, facilities can also temporarily use storm water in lieu of uncontaminated water to optimize of biological treatment systems.

For other iron and steel processes, EPA believes it is prudent to collect storm water from the area within outdoor wastewater treatment facilities, particularly where wastewater treatment sludges are dewatered and handled at blast furnaces, sinter plants, steelmaking operations, hot forming mills (scale and oil removal as well as wastewater treatment), and steel finishing wastewater treatment plants.

EPA does not advocate unrestricted collection and treatment of process area storm water with process waters, either at by-product recovery coke plants or at facilities in other subcategories. For example, by-product recovery and non-recovery coke plants should use conventional storm water control measures to handle coal and coke pile runoff, storm water from the battery areas, and storm water collected away from the by-products recovery areas. Other examples of storm water that would be either impracticable or uneconomic to treat in process wastewater treatment facilities include building roof storm drainage from hot forming and steel finishing mills and storm drainage from raw material storage areas and plant roadways.

For the steelmaking subcategory, EPA revised BPT, BAT, BCT, and PSES limitations and standards for basic oxygen furnaces with semi-wet air pollution control. EPA has allowed the permit authority or pretreatment control authority to determine limitations based on best professional judgment, when safety considerations warrant. The Agency believes best professional judgment will allow the permit authority or pretreatment control authority to reflect the site-specific nature of the discharge. EPA is doing this because, although the 1982 regulation requires basic oxygen furnace semi-wet air pollution control to achieve zero discharge of process wastewater pollutants, currently not all of the sites are able to achieve this discharge status because of safety and operational considerations which preclude some sites from balancing the water applied for BOF gas conditioning with evaporative losses to achieve zero discharge. The Agency recognizes the benefit of using excess water in basic oxygen furnaces with semi-wet air pollution control systems in cases where safety considerations are present. The Agency justifies the increased allowance in this case because of the employee safety and manufacturing considerations (reduced production equipment damage and lost production).

16.6 Water Bubble

The “water bubble” is a regulatory mechanism provided in the current regulation at 40 CFR 420.03 to allow for trading of identical pollutants at any single steel facility with multiple compliance points. The bubble has been used at some facilities to realize cost savings and/or facilitate compliance.

The water bubble provision in the 1982 rule had the following restrictions:

- Trades can be made only for like pollutants (e.g., lead for lead, not lead for zinc);
- Alternative effluent limitations resulting from the application of the water bubble must comply with applicable water quality standards;
- Each outfall must have specific, fixed limitations for the term of the permit;
- Trades involving cokemaking and cold rolling operations are prohibited;

- Each trade must result in a minimum net reduction in pollutant loading (15 percent for TSS and O&G, and 10 percent for all other traded pollutants); and

- Only existing sources may apply the water bubble.

The water bubble provisions from the 1982 regulation were carried forward in the current regulation, with the modifications described in the preamble, including the following:

- Water bubble trades are allowed for new sources and for new Subpart M operations;

- Water bubble trades for cokemaking and cold rolling operations are now authorized;

- Water bubble trades for cokemaking operations are authorized only when the alternative limitations are more stringent than the Subpart A limitations otherwise applicable to those operations;

- Water bubble trades for O&G are prohibited;

- Water bubble trades for 2,3,7,8-TCDF in sintering operations are prohibited; and

- Eliminate the minimum net reduction provisions (formerly codified at 40 CFR 420.03(b)).

The water bubble provisions allow alternative effluent limitations where a facility, in effect, trades pollutant discharges from one outfall or NPDES permit compliance monitoring point to another. Unlike variances, facilities may request to apply the water bubble wherever they can meet the conditions governing its use. Permit authorities are authorized to include effluent limitations in water bubble trades in NPDES permits in permit applications and renewals.

For the final rule, EPA is prohibiting trading of O&G between outfalls. EPA is concerned that different process units may discharge different types of O&G, and that trading might increase the amount of a more environmentally harmful type of O&G (e.g., petroleum-based), while reducing the amount of a less harmful type (e.g., animal fats).

When estimating the incremental investment and operating and maintenance costs associated with the final regulation, the Agency assumed that no facilities would use the water bubble. Consequently, any use of the water bubble would represent cost savings.

16.7 Ammonia Waiver

For the final rule, EPA promulgated pretreatment standards for ammonia (as N) for the cokemaking and sintering subcategories because of the high loads of ammonia in wastewaters from those subcategories to POTWs that do not have nitrification capability. However, EPA was aware that some POTWs treating wastewaters from these subcategories have nitrification capability. EPA received several compelling comments supporting an ammonia standard waiver in these cases and encouraging EPA to provide this mechanism for the cokemaking, sintering, and ironmaking subcategories. No commenters opposed this mechanism. EPA concludes that an ammonia standard waiver will be equally protective of the environment and lead to potential savings for some iron and steel facilities. Thus, the final rule specifies that ammonia (as N) pretreatment standards do not apply to cokemaking, ironmaking, and sintering facilities discharging to POTWs with nitrification capability. As a further point of clarification, EPA defines nitrification at §420.02(s) as follows:

> "...means oxidation of ammonium salts to nitrites (via Nitrosomas bacteria) and the further oxidation of nitrite to nitrate via Nitrobacter bacteria. Nitrification can be accomplished in either: (1) a single or two-stage activated sludge wastewater treatment system; or (2) wetlands specifically developed with a marsh/pond configuration and maintained for the express purpose of removing ammonia-N.
>
> Indicators of nitrification capability are: (1) biological monitoring for ammonia oxidizing bacteria (AOB) and nitrite oxidizing bacteria (NOB) to determine if the nitrification is occurring; and (2) analysis of the nitrogen balance to determine if nitrifying bacteria reduce the amount of ammonia and increase the amount of nitrite and nitrate."

While EPA has included the option of an ammonia waiver for those facilities discharging to POTWs that nitrify, the Agency determined a certification requirement was unnecessary in the final rule and that pretreatment control authorities can best determine whether or not a POTW has nitrification capability. The pretreatment control authorities issuing POTW individual control mechanisms to iron and steel facilities will determine whether pretreatment standards for ammonia (as N) are applicable using the definition of nitrification provided at §420.02(s) of the final rule.

16.8 Compliance Monitoring

Permit writers and control authorities must establish requirements for regulated facilities to monitor their effluent to ensure that they are complying with permit limitations. As specified in 40 CFR Parts 122.41, 122.44, and 122.48, all NPDES permits must specify requirements for using, maintaining, and installing (if appropriate) monitoring equipment; monitoring type, intervals, and frequencies that will provide representative data; analytical methods; and reporting and record keeping. The NPDES program requires permittees (with certain specific exceptions) to monitor for limited pollutants and report data at least once per year. Control authorities must generally require similar monitoring techniques and frequencies for indirect dischargers, but 40 CFR 403.12(e) requires twice per year reporting for industrial users (rather than once per year for direct dischargers).

The NPDES permit regulations at §122.41(j)(4) and the pretreatment regulations at §403.12(g) require that facilities conduct sampling and analyses to monitor compliance according to the techniques specified at 40 CFR Part 136, as amended. Table 16-5 presents the sampling and analytical methods for those pollutants regulated under Part 420 (see Part 136 for the specific analytical methods for sample handling, sample holding time, and approved sample containers).

Except as noted below, the Agency has not promulgated specific monitoring requirements or monitoring frequencies in the iron and steel regulation; therefore, permit authorities may establish monitoring requirements and monitoring frequencies at their discretion. Sections 16.8.1 through 16.8.3 provide guidance for establishing those requirements. EPA has specified the point of compliance monitoring to demonstrate compliance with the pretreatment standards for 2,3,7,8-TCDF for the sintering subcategory. This exception is described in Section 16.8.3.

16.8.1 Sample Types

EPA recommends flow-proportioned, 24-hour composite samples for the following pollutants:

- TSS;
- Ammonia (as N);
- Total cyanide;
- Total phenolics;
- 2,3,7,8-TCDF;
- Benzo(a)pyrene; and
- Naphthalene.

Part 136 requires facilities to collect grab samples for O&G. Several iron and steel permits are written to require collection of three grab samples for O&G in a 24-hour monitoring day, with the results averaged to represent a daily sample. The sample types for pH can range from a one-time grab sample during a monitoring day for operations where pH is usually not a control parameter (e.g., continuous casting, hot forming) to continuous sampling where pH is a critical aspect of the wastewater to be treated or a critical control parameter for operation of wastewater treatment facilities (e.g., steel finishing and other subcategories where metals precipitation is a control technology).

16.8.2 Monitoring Frequency

The monitoring frequencies specified in iron and steel NPDES and POTW permits vary depending upon the size of the facility, potential impacts on receiving waters, compliance history, and other factors, including monitoring policies or regulations required by permit authorities. A few iron and steel permits for large mills have required monitoring for all regulated pollutants as frequently as five times per week. Other permits for less complex facilities require twice monthly monitoring. When developing the revisions to Part 420, EPA considered a monitoring frequency of once per week for regulated pollutants, except for 2,3,7,8-TCDF, for which the Agency considered a monthly monitoring frequency. Most permits for iron and steel facilities require facilities to continuously monitor and record their discharge flow rates and report daily 24-hour total flow.

Facilities may monitor effluent more frequently than specified in their permits; however, the results must be reported in accordance with §122.41(l)(4)(ii) for direct dischargers or with §403.12(g)(5) for indirect dischargers.

16.8.3 Compliance Monitoring Locations

The NPDES permit regulations at §122.41(j)(1) require that monitoring samples and measurements be representative of the monitored activity; §125.3(e) requires that technology-based effluent limits be applied prior to or at the point of discharge. See also §122.44(i) and §122.45(h). The pretreatment regulations at §403.12(g)(3) are analogous to NPDES permit regulations at §122.41(j)(1). The choice of monitoring location for use of the combined wastestream formula is §403.6(e)(4). The pretreatment regulations at §403(d) prohibit facilities from diluting their wastewater to meet categorical pretreatment standards. The discharge from a wastewater treatment facility is usually a point where measurements will be most representative of the treated effluent. Under circumstances where dilution with relatively low volumes of noncontact cooling water or storm water will not interfere with compliance determinations, permit writers may apply the technology-based effluent limits at the point of discharge to a receiving water or to a POTW.

EPA specifies the point of compliance monitoring to demonstrate compliance with the effluent limitations guidelines and standards for 2,3,7,8-TCDF for the sintering subcategory (see §420.29). For sintering direct dischargers, compliance is determined at the point after treatment of sinter plant wastewater separately or in combination with blast furnace wastewater, but prior to mixing with process wastewaters from processes other than sintering and ironmaking, non-process wastewaters, and noncontact cooling water in an amount greater than 5 percent by volume of the sintering process wastewaters. For sintering indirect dischargers, compliance is determined at the point after treatment of sinter plant wastewater separately or in combination with blast furnace wastewater, but prior to mixing with process wastewaters from processes other than sintering and ironmaking, non-process wastewaters, and noncontact cooling waters.

EPA has given permit writers the flexibility to apply pH effluent limitations at the point of discharge from a wastewater treatment facility or at the point of discharge to a receiving water (see §420.07). This mechanism is designed to prevent the need for facilities to reneutralize their treated wastewater to a pH of 6.0 to 9.0 if they can achieve the same end by mixing treated wastewater with nonregulated wastewater, such as large volumes of noncontact cooling water.

16.9 NPDES Permit and Pretreatment Variances and Exclusions

The CWA and the NPDES permit regulations allow certain variances from technology-based effluent limitations guidelines and standards for exceptional cases. The water bubble provisions of Part 420 allow alternative effluent limitations where a facility can trade pollutant discharges from one outfall or NPDES permit compliance monitoring point to another. Unlike variances, facilities may use the water bubble wherever they can meet the water bubble conditions. The permit writer develops the variance and alternative limitations during the time of draft permit renewal so that the variance and alternative limitations are subject to public review and comment at the same time the entire permit is put on public notice. The variance and alternative limitations remain in effect for the term of a permit, unless the permit writer modifies it prior to expiration.

A permit applicant must meet specific data requirements before a variance is granted. As the term implies, a variance is an unusual situation, and the permit writer should not expect to routinely receive variance requests. The permit writer should consult 40 CFR §124.62 for procedures on making decisions on the different types of variances.

16.9.1 Economic Variances

Section 301(c) of the CWA allows a variance for nonconventional pollutants from technology-based BAT effluent limitations due to economic factors, at the request of the facility and on a case-by-case basis. There are no implementing regulations for §301(c); rather, variance requests must be made and reviewed based on the statutory language in §301(c). The economic variance may also apply to nonguideline limits in accordance with 40 CFR §122.21(m)(2)(ii). The applicant normally files the request for a variance from effluent limitations developed from BAT guidelines during the public notice period for the draft permit. Other filing time periods may apply, as specified in 40 CFR §122.21(m)(2). The variance application must show that the modified requirements:

1) Represent the maximum use of technology within the economic capability of the owner or operator; and

2) Result in further progress toward the goal of discharging no process wastewater.

Facilities in industrial categories other than utilities must conduct three financial tests to determine if they are eligible for a 301(c) variance. Guidance for conducting the financial tests is available from EPA's Office of Wastewater Management. Generally, EPA will grant a variance only if all three tests indicate that the required pollution control is not economically achievable, and the applicant makes the requisite demonstration regarding "reasonable further progress."

With respect to the second requirement for a 301(c) modification, the applicant must, at a minimum, demonstrate compliance with all applicable BPT limitations and pertinent water-quality standards. In addition, the proposed alternative requirements must reasonably improve the applicant's discharge.

16.9.2 Variances Based on Localized Environmental Factors

Section 301(g) of the CWA allows a variance for certain nonconventional pollutants (ammonia, chlorine, color, iron, and total phenols) from BAT effluent limitations guidelines due to local environmental factors. The discharger must file a variance application that shows the following:

- The modified requirements result in compliance with BPT and water-quality standards of the receiving stream.

- Other point or nonpoint source discharges will not need additional treatment as a result of the variance approval.

- The modified requirements will not interfere with protection of public water supplies or with protection and propagation of a balanced population of shellfish, fish, and wildfowl, and will allow recreational activities in and on the water. Also, the modified requirements will not result in quantities of pollutants that may reasonably be anticipated to pose an unacceptable risk to human health or the environment, cause acute or chronic toxicity, or promote synergistic properties.

Section 301(g) also allows petitioners to add other nonconventional pollutants to the variance list in their petition. The petitioner must demonstrate that the pollutants do not exhibit the characteristics of toxic pollutants. Certain time restrictions and other conditions also apply (see §301(g)(4)(C)).

Permit writers must review the request to ensure that it complies with each of the requirements for this type of variance. The 301(g) variance request involves significant water-quality assessment, including aquatic toxicity, mixing zone, and dilution model analyses, and the possible development of site-specific criteria. In addition, the permit writer must assess many complex human health effects, including carcinogenicity, teratogenicity, mutagenicity, bioaccumulation, and synergistic propensities. Permit writers should use EPA's Draft 301(g) Technical Guidance Manual (Reference 16-2) in assessing variance requests.

Several Section 301(g) variances have been granted for iron and steel facilities. Most of these have been for ammonia as nitrogen and total phenols discharged from blast furnace operations.

16.9.3 Central Treatment Provision

Under 40 CFR 420.01(b), the central treatment provision of the 1982 iron and steel regulation, EPA identified 21 facilities that were temporarily excluded from the provisions of Part 420 because of economic considerations. This exclusion would not be granted unless the owner or operator of the facility requested the Agency to consider establishing alternative effluent limitations and provided the Agency with certain information consistent with 40 CFR 420.01(b)(2) on or before July 26, 1982. See 47 FR 23285 (May 27, 1982).

The Agency did not receive any comments supporting the removal of the central treatment provision. Rather, commenters asked EPA to expand the provision because they were concerned that the costs of the proposed rule would be too high if the limits and standards were made more stringent. Commenters stated that economic conditions were similar to those in 1982 and that the central treatment provision should remain a viable compliance option in Part 420.

EPA disagrees with commenters that it should expand the central treatment provision. Because of the prevailing economic situation in the iron and steel industry, technological reasons in some subcategories, and performance issues in others, EPA has decided to go forward with new or revised regulations for only four subcategories (cokemaking, sintering, steelmaking, and a subcategory for other operations). The final rule has minimal impact on the 21 eligible mills. With the substantially reduced projected economic burden on the industry, the Agency does not believe that expanding § 420.01(b)(2) is necessary.

The final rule leaves the central treatment provision (§ 420.01(b)(2)) unchanged from the 1982 regulation. This allows any mill whose permit is based on this provision to continue to use it, but does not extend the provision to any additional mills.

16.10 References

16-1 U.S. Environmental Protection Agency. Guidance Manual for the Use of Production-Based Pretreatment Standards and the Combined Wastestream Formula. EPA 833/B-85-201, Washington, DC, September 1985.

16-2 U.S. Environmental Protection Agency. Draft 301(g) Technical Guidance Manual. Washington, DC, 1984.

Table 16-1

40 CFR Part 420 - Subcategorization

1982/1984 Part 420	Current Part 420
A. Cokemaking By-product recovery cokemaking - iron and steel By-product recovery cokemaking- merchant Beehive cokemaking	A. Cokemaking *BPT, BCT* By-product recovery cokemaking - iron and steel By-product recovery cokemaking - merchant Non-recovery cokemaking *BAT, NSPS, PSES, PSNS* By-product recovery cokemaking Non-recovery cokemaking
B. Sintering	B. Sintering with wet air pollution control systems with dry air pollution control systems
C. Ironmaking Iron blast furnace Ferromanganese blast furnace	C. Ironmaking Iron blast furnace
D. Steelmaking BOF, EAF - semi-wet BOF - wet, suppressed combustion BOF, open hearth, EAF - wet	D. Steelmaking EAF - semi-wet BOF - wet-open combustion EAF - wet BOF - wet-suppressed combustion BOF - semi-wet
E. Vacuum Degassing	E. Vacuum Degassing
F. Continuous Casting	F. Continuous Casting
G. Hot Forming Primary mills - carbon and specialty without scarfing with scarfing Section mills carbon specialty Flat mills hot strip and sheet - carbon and specialty carbon plate mills specialty plate mills Pipe and tube mills - carbon and specialty	G. Hot Forming Primary mills - carbon and specialty without scarfing with scarfing Section mills carbon specialty Flat mills hot strip and sheet - carbon and specialty carbon plate mills specialty plate mills Pipe and tube mills - carbon and specialty

Table 16-1 (Continued)

1982/1984 Part 420	Current Part 420
H. Salt Bath Descaling Oxidizing batch - sheet and plate batch - rod and wire batch - pipe and tube continuous Reducing batch continuous	H. Salt Bath Descaling Oxidizing batch - sheet and plate *batch - rod and wire* *batch - pipe and tube* continuous Reducing *batch* continuous
I. Acid Pickling Sulfuric acid (spent acids & rinses) rod, wire and coil bar, billet and bloom strip, sheet and plate pipe, tube and other products fume scrubbers Hydrochloric acid (spent acids & rinses) rod, wire and coil strip, sheet and plate pipe, tube and other products fume scrubbers acid regeneration (absorber vent scrubber) Combination acid pickling (spent acids & rinses) rod, wire and coil bar, billet and bloom strip, sheet and plate- continuous strip, sheet and plate - batch pipe, tube and other products fume scrubbers	I. Acid Pickling Sulfuric acid (spent acids & rinses) *rod, wire and coil* bar, billet and bloom strip, sheet and plate *pipe, tube and other products* fume scrubbers Hydrochloric acid (spent acids & rinses) *rod, wire and coil* strip, sheet and plate *pipe, tube and other products* fume scrubbers acid regeneration (absorber vent scrubber) Combination acid pickling (spent acids & rinses) rod, wire and coil bar, billet and bloom strip, sheet and plate- continuous strip, sheet and plate - batch pipe, tube and other products fume scrubbers
J. Cold Forming Cold rolling mills recirculation- single stand recirculation- multiple stands combination direct application - single stand direct application - multiple stands Cold worked pipe and tube using water using oil solutions	J. Cold Forming Cold rolling mills recirculation- single stand recirculation- multiple stands combination direct application - single stand direct application - multiple stands *Cold worked pipe and tube* *using water* *using oil solutions*
K. Alkaline Cleaning Batch Continuous	K. Alkaline Cleaning Batch Continuous

Table 16-1 (Continued)

1982/1984 Part 420	Current Part 420
L. Hot Coating Galvanizing, terne coating and other coatings strip, sheet and miscellaneous products Galvanizing and other coatings wire products and fasteners Fume Scrubbers	L. Hot Coating Galvanizing, terne coating and other coatings strip, sheet and miscellaneous products *Galvanizing and other coatings* *wire products and fasteners* Fume Scrubbers
	M. Other Operations Direct-reduced iron Forging Briquetting

Table 16-2

40 CFR Part 420 - Process and Non-Process Wastewaters

Manufacturing Operations	Process Wastewaters	Non-Process Wastewaters
A. Cokemaking		
By-product recovery coke plants	Waste ammonia liquor Coke oven gas desulfurization wastewater Crude light oil wastewaters Ammonia still operation wastewater Coke oven gas condensates Final gas cooler blowdown Wastewater from barometric condensers Wastewaters from NESHAP controls Wastewater from wet air pollution control Other miscellaneous process wastewaters Biological treatment control water	Wastewaters from groundwater remediation systems Storm waters from the immediate process area
Non-recovery coke plants	None	Process water treatment residuals Boiler blowdown Wastewater from wet air pollution control from heat recovery Storm waters from the immediate process area
B. Sintering	Wastewaters from wet air pollution control Sinter cooling wastewater Wastewaters from belt spray and equipment cleaning	
C. Ironmaking	Wastewaters from blast furnace gas cooling and gas cleaning operations Blast furnace gas seal wastewater Blast furnace drip leg wastewater Wastewater from pump seals and equipment cleaning	
D. Steelmaking	Wastewaters from semi-wet and wet air pollution control systems	Wastewaters from BOF groundwater remediation systems
E. Vacuum Degassing	Direct gas contact vacuum system water	
F. Continuous Casting	Direct contact spray system wastewater Leaks from mold and machine cooling water system Flume flush wastewater Wastewater from equipment cleaning	Wastewater from caster mold and machine cooling

Table 16-2 (Continued)

Manufacturing Operations	Process Wastewaters	Non-Process Wastewaters
G. Hot Forming	Descaling wastewater Flume flush water Direct contact roll cooling water Direct contact product cooling water Roll shop wastewaters Leaks and losses from mill lubricating systems Scarfer emissions control wastewater Wastewater from shear and saw cooling Wastewater collected in basement sumps Wastewater from equipment cleaning	Noncontact cooling water for reheat furnaces
H. Salt Bath Descaling	Rinse waters Fume scrubber water Quench water Drag-out and other losses from salt baths	
I. Acid Pickling	Rinse waters Fume scrubber waters Spent acid solutions Wastewater from wet looping pits Leaks and spills collected in process area secondary containment Wastewater from raw materials handling Wastewater from tank cleanouts	
J. Cold Forming	Spent rolling solutions (rolling oils, detergents, cleaners) Roll shop wastewaters Wastewater colleted in basement sumps	
K. Alkaline Cleaning	Rinse waters Spent cleaning baths Wastewater from tank cleanouts	
L. Hot Coating	Rinse waters Fume scrubber waters Acid and alkaline cleaning solution losses Losses of coating line flux solutions Wastewater from tank cleanouts	
M. Other Operations		
Direct-Reduced Iron	Wastewaters from wet air pollution control	
Briquetting	none	
Forging	Direct contact cooling water Losses from hydraulic and lubricating systems	

Table 16-3

Example 1: Application of 40 CFR Part 420
Direct Discharge Blast Furnaces and Sinter Plant

BPT/BAT												
Operation	Production (tons/day)	Total Suspended Solids		Oil & Grease		Ammonia-N		Total Cyanide		Phenol		Units
		Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average	
Blast furnace A §420.32(a)/§420.33(a)	4,500	0.0782	0.026			0.00876	0.00292	0.00175	0.000876	0.0000584	0.0000292	lbs/1,000 lb
		704	234			79	26.3	15.8	7.88	0.526	0.263	lbs/day
Blast furnace B §420.32(a)/§420.33(a)	3,900	0.0782	0.026			0.00876	0.00292	0.00175	0.00088	0.0000584	0.0000292	lbs/1,000 lb
		610	203			68	22.8	13.7	6.83	0.456	0.228	lbs/day
Sintering §420.22/§420.23	4,100	0.0751	0.025	0.015	0.00501	0.015	0.00501	0.003	0.0015	0.0001	0.0000501	lbs/1,000 lb
		616	205	123	41.1	123	41.1	24.6	12.3	0.820	0.411	lbs/day
NPDES Permit Limits												
Total Mass Limitations (lbs/day)		**1,930**	**642**	**123**	**41.1**	**270**	**90.1**	**54.0**	**27.0**	**1.80**	**0.70**	
Total Mass Limitations (kg/day)		**875**	**291**	**55.8**	**18.6**	**122**	**40.9**	**24.5**	**12.2**	**0.82**	**0.32**	

BPT/BAT												
Operation	Production (tons/day)	Total Lead		Total Zinc		Total Residual Chlorine		2,3,7,8-TCDF				Units
		Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average			
Blast furnace A §420.32(a)/§420.33(a)	4,500	0.000263	0.0000876	0.000394	0.000131	0.000146						lbs/1,000 lb
		2.37	0.788	3.55	1.18	1.31						lbs/day
Blast furnace B §420.32(a)/§420.33(a)	3,900	0.000263	0.0000876	0.000394	0.000131	0.000146						lbs/1,000 lb
		2.05	0.683	3.07	1.02	1.14						lbs/day
Sintering §420.22/§420.23	4,100	0.000451	0.00015	0.000676	0.000225	0.00025		<ML				lbs/1,000 lb
		3.70	1.23	5.54	1.85	2.05						lbs/day
NPDES Permit Limits												
Total Mass Limitations (lbs/day)		**8.12**	**2.70**	**12.16**	**4.05**	**4.50**						
Total Mass Limitations (kg/day)		**3.68**	**1.22**	**5.51**	**1.83**	**2.04**						
Other Limitations								**ND (10 ppq)**				

NOTE: Effluent limits for total residual chlorine are applicable only if the effluent is chlorinated as part of process wastewater treatment. ND - Not detected (detection limit), and ML - minimum level.

Table 16-4

Example 2: Application of 40 CFR Part 420 Indirect Discharge Coke Plant

PSES - Pretreatment Standards for Existing Sources								
		Ammonia - N		**Total Cyanide**		**Naphthalene**		
Operation	**Production (tons/day)**	**Maximum**	**Average**	**Maximum**	**Average**	**Maximum**	**Average**	**Units**
Cokemaking 40CFR 420.15(a)	4430	0.0333	0.0200	0.00724	0.00506	0.0000472	0.0000392	lbs/1,000 lb
		295	177	64	45	0.418	0.347	lbs/day
Ground Water Remediation	35	70.6	42.5	15.4	10.7	26.1	21.7	mg/l
	gpm	29.7	17.9	6.46	4.51	11	9.12	lbs/day
Process Area Storm Water	5	70.6	42.5	15.4	10.7	26.1	21.7	mg/l
	gpm	4.24	2.55	0.923	0.644	1.57	1.3	lbs/day
Pretreatment Limitations								
Total Mass Limitations (lbs/day)		**329**	**198**	**71.5**	**50**	**12.9**	**10.8**	
Total Mass Limitations (kg/day)		**149**	**89.6**	**32.4**	**22.7**	**5.87**	**4.88**	

Table 16-5

List of Approved Test Methods for Pollutants Regulated Under the Final Rule for the Iron and Steel Point Source Category

Parameter and Units	Method: EPA (a)	STD Method 18th ed.	ASTM	USGS (a)	Other
Conventional Pollutants					
Total suspended solids, mg/L Gravimetric, 103°-105°, post washing of residue	160.2	2540 D		I-3765-85	
Oil and grease, hexane extractable material (HEM), mg/L n-Hexane extraction and gravimetry (a)	1664, Rev. A				
pH, pH units Eletrometric measurement, or Automated electrode	150.1	4500 H^+ B	D1293-84(90)(A or B)	I-1586-85	973.41 (a) Note (a)
Nonconventional Pollutants					
2,3,7,8 TCDF (CAS 51207-31-9) GC/MS	1613				
Ammonia as nitrogen, mg/L (CAS 7664-41-7) Manual distillation (at pH 9.5) (a) followed by... Nesslerization Titration Electrode Automated phenate, or Automated electrode	350.2 350.2 350.2 350.3 350.1	4500-NH_3 B 4500-NH_3 C 4500-NH_3 E 4500-NH_3 F or G 4500-NH_3 H	D1426-93(A) D1426-93(B)	I-3520-85 I-4523-85	973.49 (a) 973.49 (a) Note 7
Phenols, total, mg/L Manual distillation (a) followed by: Colorimetric (4AAP) manual, or Automated (a)	420.1 420.1 420.2				Note (a) Note (a)
Priority Pollutants					
Cyanide, total, mg/L (CAS 57-12-5) Manual distillation with $MgCl_2$ followed by Titrimetric, or Spectrophotometric, manual or Automated (a)	335.2 (a) 335.3 (a)	4500-CN C 4500-CN D 4500-CN E	D2036-91(A) D2036-91(A)	I-3300-85	p.22 (a)
Benzo-a-pyrene (CAS 50-32-8) GC GC/MS HPLC	610 625, 1625 610	6410 B, 6440 B	D4657-92		

Table 16-5 (Continued)

Parameter and Units	Method				
	EPA (a)	STD Method 18th ed.	ASTM	USGS (a)	Other
Priority Pollutants (continued)					
Naphthalene (CAS 91-20-3) GC GC/MS HPLC	 610 625, 1625 610	6410 B, 6440 B			

(a) - See 40 CFR Part 136 for footnotes and note references.
CAS: Chemical Abstracts Service.

SECTION 17

GLOSSARY

Acid Cleaning. Treatment of steel surfaces with relatively mild acid solutions to remove surface dirt and light oxide coatings. Scale and/or heavy oxide removal is considered acid pickling (see below). Acid cleaning operations are typically conducted for surface preparation prior to application of hot dip or electrolytic metal coating and after cold forming and annealing operations.

Acid Pickling. Scale and/or oxide removal from steel surfaces using relatively strong acid solutions. Acid pickling operations are typically conducted after hot forming operations and prior to subsequent steel finishing operations (e.g., cold forming, annealing, alkaline cleaning, metal coatings).

Acid Regeneration. Treatment of spent acid solutions by thermal and/or chemical means to produce usable acid solutions and iron-rich by-products.

Act. The Clean Water Act.

Administrator. The Administrator of the U.S. Environmental Protection Agency.

Agency. U.S. Environmental Protection Agency (also referred to as "EPA").

Agglomeration. The process of binding materials. See definitions for briquetting, nodulizing, pelletizing, and sintering.

Alkaline Cleaning. Application of solutions containing caustic soda, soda ash, alkaline silicates, or alkaline phosphates to a metal surface primarily to remove mineral deposits, animal fats, and oils.

Alloy. A substance that has metallic properties and is composed of two or more chemical elements of which at least one is a metal.

Alloy Steel. Steel is classified as alloy when the maximum of the range given for the content of alloying elements exceeds one or more of the following: manganese, 1.65 percent; silicon, 0.60 percent; copper, 0.60 percent; or in which a definite range or a definite minimum quantity of any of the following elements is specified or required within the limits of the recognized field of constructional alloy steels: aluminum, boron, chromium (less than 10 percent), cobalt, lead, molybdenum, nickel, niobium (columbium), titanium, tungsten, vanadium, zirconium, or any other alloying element added to obtain a desired alloying effect.

Alloying Materials. Additives to steelmaking processes to improve the properties of the finished products. Chief alloying elements in medium alloy steels are: nickel, chromium, manganese, molybdenum, vanadium, silicon, and copper.

Ammonia, Free and Fixed. Free ammonia is ammonia present in a form that is readily dissociated by heat, such as ammonium carbonate. Fixed ammonia is ammonia present in a form which requires the presence of a strong alkali to affect displacement of the ammonia from the compound in which it is present, such as ammonium chloride.

Ammonia Liquor (or Flushing Liquor). An aqueous solution used to condense moisture and tars from coke oven gas derived from coals charged to a by-product recovery coke oven battery. Excess ammonia liquor, or waste ammonia liquor, is flushing liquor rejected from the flushing liquor recirculating loop through the coke oven gas collecting mains and the coal tar decanter, and generally comprises the free and bound moisture contained in the coal charge to the by-product coke ovens. Weak ammonia liquor is ammonia liquor that has been processed in a free or fixed ammonia distillation column (ammonia still) for ammonia recovery to the coke oven gas stream prior to recovery of ammonium sulfate, anhydrous ammonia, or other by-product ammonium compounds.

Ammonia Still. A steam-stripping column in which ammonia and acid gases (hydrogen cyanide, hydrogen sulfide) are removed from waste ammonia liquor and other ammonia-containing wastewaters. A "free" still operates with steam only, with no alkali addition, to remove ammonia and acid gases. A "fixed" still is similar to a "free" still except lime, or more commonly sodium hydroxide, is added to the liquor to liberate ammonia from its compounds so it can be steam stripped.

Angle. A very common structural or bar shape with two legs of equal or unequal length intersecting at 90 degrees.

Annealing. A heat treatment process in which steel is exposed to an elevated temperature in a controlled atmosphere for an extended period of time and then cooled. Annealing is performed to relieve stresses; increase softness, ductility, and toughness; and/or to produce a specific microstructure in the steel.

Argon Bubbling. Injection of argon into molten metal for rapid and uniform mixing of alloys, temperature homogenization, adjustment of chemical composition, and partial removal of non-metallic inclusions. Argon bubbling methods include argon stirring, trimming, and rinsing.

Argon/Oxygen Decarburization (AOD). A process by which an electric arc furnace heat is decarburized by blowing argon and oxygen into the steel at varying ratios.

AWQC. Ambient Water Quality Criteria.

Baghouse. A dry air pollution control device comprising an enclosure containing multiple fabric filter elements (bags) for removal of particulate matter from gas streams.

Bar. Produced from ingots, blooms, or billets covering the following range: rounds, 3/8 to 8-1/4 inches inclusive; squares, 3/8 to 5-1/2 inches; round-cornered squares, 3/8 to 8 inches inclusive;

hexagons, 1/4 to 4-1/16 inches inclusive; flats, 13/64 inches and over in specified thicknesses and not over 6 inches specified width.

Basic Oxygen Furnace (BOF). Pear-shaped, refractory-lined vessel used to convert a charge of molten iron and steel scrap into molten steel by the injection of high pressure oxygen into the furnace bath.

Basic Oxygen Furnace (BOF) Shop. A building or structure containing one or more basic oxygen furnaces and ancillary processes and equipment (e.g., hot metal desulfurization, hot metal charging, scrap charging, oxygen and flux additions, furnace tapping, ladle preparation, deslagging and slag handling, and primary and secondary air emission control equipment).

Basic Oxygen Steelmaking. Steelmaking process carried out in a basic lined furnace shaped like a pear. High-pressure oxygen is blown vertically downward on the surface of the molten iron through a water-cooled lance.

BAT. Best available technology economically achievable, as defined by section 304(b)(2)(B) of the Clean Water Act. See also Effluent Limitations Guidelines and Standards.

Battery. See By-Product Recovery Coke Battery.

BCT. Best conventional pollutant control technology, as defined by section 304(b)(4) of the Clean Water Act. See also Effluent Limitations Guidelines and Standards.

Beam. A member of the structural steel family. Beams come in three varieties: the standard H, I, and the wide flange used for weight-supporting purposes.

Beneficiate. To upgrade the iron content of iron-bearing materials.

Billet. A semi-finished piece of steel formed by casting or from hot rolling an ingot or a bloom. It may be square, but is never more than twice as wide as thick. Its cross-sectional area is usually not more than 36 square inches.

Blast Cleaning. Abrasive grit blasting of steel to remove scale; used in place of or in combination with acid pickling.

Blast Furnace. A large conical-shaped furnace used to reduce and melt iron-bearing materials to molten iron as the primary product. By-products include combustible blast furnace gas and blast furnace slag.

Blast Furnace Charge. The raw materials added to the blast furnace that react when heated to produce molten iron. The principal raw materials charged to blast furnaces include coke, limestone, beneficiated iron ores, and sinter.

<u>Blast Furnace Gas Seals</u>. Water-flooded seals located on a blast furnace gas main for collection and removal of blast furnace gas condensate from the blast furnace gas main. Blast furnace gas seal water is contaminated with pollutants associated with blast furnace operations (e.g., ammonia-N, cyanide, phenolic compounds).

<u>Bloom</u>. A semi-finished piece of steel formed by casting or from hot rolling or forging of an ingot. A bloom is square or not more than twice as wide as thick. Its cross-sectional area is usually not less than 36 square inches.

<u>Blowdown</u>. The partial discharge of water from a recirculating process or cooling water system to correct hydraulic imbalances in the recirculating system or to control concentrations of substances in the recirculating water.

<u>BMP</u>. Best management practices, as defined by section 304(e) of the Clean Water Act or as authorized by section 402 of the Clean Water Act**.**

<u>BOD_5</u>. Five-day biochemical oxygen demand. A measure of biochemical decomposition of organic matter in a water sample. It is determined by measuring the dissolved oxygen consumed by microorganisms to oxidize the organic contaminants in a water sample under standard laboratory conditions of five days and 20°C. BOD_5 is not related to the oxygen requirements in chemical combustion.

<u>Bosh.</u> The section of the blast furnace between the hearth and the stack, where melting of iron starts.

<u>BPT</u>. Best practicable control technology currently available, as defined by section 304(b)(1) of the Clean Water Act. See also Effluent Limitations Guidelines and Standards.

<u>Briquetting</u>. A hot or cold process that agglomerates (presses together) iron-bearing materials into small lumps without melting or fusion. Used as a concentrated iron ore substitute for scrap in EAFs.

<u>Butt-Welded Pipe/Tube</u>. A continuous strip of hot-rolled skelp that is heated, formed into a circular shape, and then welded to form the pipe or tube.

<u>By-Product Recovery Coke Battery</u>. A coke-producing unit comprising numerous adjoining, refractory-lined, slot-type ovens; coal charging and coke pushing facilities; coke quench stations; and coke oven gas collecting mains.

<u>By-Product Recovery Cokemaking</u>. Process in which coal is distilled at high temperatures in the absence of air to produce coke and recover the volatile compounds as by-products (e.g., crude coal tar, crude light oil).

<u>CAA</u>. Clean Air Act (42 U.S.C. 7401 *et seq*., as amended *inter alia* by the Clean Air Act Amendments of 1990 (Pub. L. 101-549, 104 stat. 2394)).

Carbon Steel. Steel that owes its properties chiefly to various percentages of carbon without substantial amounts of other alloying elements. Steel is classified as carbon steel when no minimum content of elements other than carbon is specified or required to obtain a desired alloying effect and when the maximum content for any of the following do not exceed the percentage noted: manganese, 1.65 percent; silicon, 0.60 percent; copper, 0.60 percent.

Cast Iron. The metallic product obtained by reducing iron ore with carbon at a temperature sufficiently high to render the metal fluid and casting it in a mold.

Casting. (1) A term applied to the act of pouring molten metal into a mold. (2) The metal object produced by such pouring.

Categorical Pretreatment Standards. Standards for discharges of pollutants to POTWs promulgated by EPA, in accordance with Section 307 of the Clean Water Act, that apply to specific process wastewater discharges from particular industrial categories (40 CFR 403.6 and 40 CFR 405 - 471).

CBI. Confidential Business Information.

CFR. Code of Federal Regulations, published by the U.S. Government Printing Office. A codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the federal government.

Channels. A common steel shape consisting of two parallel flanges at right angles to the web. It is produced both in bar sizes (less than 3 inches) and in structural sizes (3 inches and over).

Clarifier. A wastewater treatment unit, usually a circular, cone-bottom steel or concrete tank with a center stilling well and mechanical equipment at the bottom for settling and subsequent removal of suspended solids from the wastewater stream. Clarifiers may also be equipped with surface skimming devices to remove floating materials and oil.

Classifier. Mechanical device used to remove heavy or coarse particulate matter from a wastewater stream.

Coating. The process of covering steel with another material, primarily for corrosion resistance.

COD. Chemical oxygen demand. A nonconventional, bulk parameter that measures the oxygen-consuming capacity of refractory organic and inorganic matter present in water or wastewater. COD is expressed as the amount of oxygen consumed from a chemical oxidant in a specific test (see Method 410.1).

Coil. Steel sheet that is wound, usually rolled in a hot-strip mill. Coils are typically more than one-quarter mile long; coils are the most efficient way to store and transport sheet steel.

Coke. The carbon product resulting from the high-temperature distillation of metallurgical coals in by-product recovery or non-recovery coke ovens.

Coke Breeze. Undersized coke particles (also referred to as coke fines) recovered from coke screening operations and coke quenching stations. Coke breeze may be used as fuel in sintering operations or may be sold as a by-product.

Coke Oven Gas. Hot gas released in the coke ovens, containing water vapor, hydrogen, methane, nitrogen, carbon monoxide, carbon dioxide, and hydrocarbons. Also contains contaminants that may be recovered as by-products: tar vapors; light oil vapors (aromatics), consisting mainly of benzene, toluene and xylene; naphthalene vapor; ammonia gas; hydrogen sulfide gas; and hydrogen cyanide gas.

Coke Pushing. The transfer of hot coke from coke ovens into quench cars, using pusher-side equipment such as a door remover and pusher.

Coke Quenching. Rapid cooling of hot coke using water.

Cold Forming. A forming operation in which the shape of the metal piece is changed by plastic deformation at a temperature below that at which recrystallization occurs. The plastic deformation can be effected by forging, rolling, extrusion, or drawing.

Cold Rolled Products. Flat-rolled products that have been finished by rolling the piece without heating (at approximately ambient temperature).

Continuous Casting. The process of casting liquid steel directly into semi-finished shapes such as slabs, billets, and rounds, thus eliminating ingot casting and associated ingot stripping, reheating, and primary rolling operations.

Contract Haul. Collection of wastewater or sludge by a private disposal service, scavenger, or purveyor in containers for subsequent transportation, treatment, and disposal off site.

Control Authority. The term “control authority” as used in section 403.12 refers to: (1) The POTW if the POTW’s submission for its pretreatment program (§403.3(t)(1)) has been approved in accordance with the requirements of §403.11; or (2) the approval authority if the submission has not been approved.

Control Water. Dilution water added to control toxicity prior to biological treatment systems.

Conventional Pollutants. The pollutants identified in section 304(a)(4) of the Clean Water Act and the regulations thereunder (i.e., biochemical oxygen demand (BOD_5), total suspended solids (TSS), oil and grease, fecal coliform, and pH).

CWA. Clean Water Act. The Federal Water Pollution Control Act Amendments of 1972 (33 U.S.C. 1251 *et seq.*), as amended, *inter alia*, by the Clean Water Act of 1977 (Public Law 95-217) and the Water Quality Act of 1987 (Public Law 100-4).

Cyanide, Free, Fixed, and Total. Free cyanide is cyanide present in a form that is amenable to chlorination, while fixed cyanide is present in a form that is not amenable to cyanide (e.g., cyanide complexes). EPA uses the term cyanide to mean total cyanide, which includes both the free and fixed forms of cyanide.

Deep-Well Injection. Long-term or permanent disposal of untreated, partially treated, or treated wastewaters by pumping the wastewater into underground formations through a bored, drilled, or driven well.

Dephenolization. A coke plant by-product recovery process in which phenol is removed from ammonia liquor and is recovered as sodium phenolate by liquid extraction and vapor recirculation.

Descaling. The process of removing scale from the surface of steel. The most common method of descaling is to crack the scale using roughened rolls and a forceful water spray (see also electrolytic and salt bath descaling).

Desulfurization. Processes to remove sulfur compounds from coke oven gases and molten iron. Coke oven gas desulfurization usually involves scrubbing the sulfur-rich gas stream with an absorbent solution, with subsequent recovery of elemental sulfur from the solution. Hot metal (molten iron) desulfurization involves treating the molten metal with lime, with subsequent collection of sulfur-rich particulate matter in fabric filter emission control devices (baghouses).

Dioxin/furans. Chlorinated dibenzo-*p*-dioxins (CDDs) and chlorinated dibenzofurans (CDFs) are closely related families of highly toxic and persistent organic chemicals formed as unwanted by-products in some commercially significant chemical reactions, during high-temperature decomposition and combustion of certain chlorinated organic chemicals, during combustion of natural materials, and through other reactions involving chlorine and organic materials. There are 210 CDD/CDF compounds (or congeners) with four to eight chlorine substitutions. Seventeen CDD/CDF congeners chlorinated at the 2,3,7,&8 lateral positions are among the most biologically active and toxic CDDs/CDFs. 2,3,7,8-Tetrachlorodibenzo-*p*-dioxin (2,3,7,8-TCDD) is the most toxic of the CDDs/CDFs. The relative toxicity of mixtures of CDDs/CDFs is described through use of International Toxicity Equivalence Factors (I-TEFs/89).

Direct Application (Once-Through). In cold rolling, the use of water, detergent, rolling oil, or other substance to remove loose organic compounds and fines, in which the substance is not recirculated.

Direct Discharger. An industrial discharger that introduces wastewater to a water of the United States with or without treatment by the discharger.

Direct-Reduced Iron (DRI). Relatively pure iron produced by reduction of iron ore (pellets or briquettes) below the melting point using gaseous (carbon monoxide-carbon dioxide, hydrogen) or solid reactants. DRI is used as a substitute for scrap steel in EAFs to minimize contaminant levels in the melted steel and to allow economic steel production when market prices for scrap are high.

DL. Sample-specific detection limit.

Drawing. A forming operation in which metal is deformed by pulling the material through a die by applying a tensile force applied on the exit side.

Dry Air Pollution Control Equipment. Control equipment in which gases are cleaned without the use of water.

DSCFM. Dry standard cubic feet per minute. A standard unit for measuring gas flow.

EAD. EPA's Engineering and Analysis Division.

Effluent Limitations Guidelines and Standards. Regulations promulgated by the U.S. EPA under authority of Sections 301, 304, 306 and 307 of the Clean Water Act that set out minimum, national technology-based standards of performance for point source wastewater discharges from specific industrial categories (e.g., iron and steel manufacturing plants). Effluent limitations guidelines and standards regulations are implemented through the NPDES permit and national pretreatment programs and include the following:

- Best Practicable Control Technology Currently Available (BPT)
- Best Available Technology Economically Achievable (BAT)
- Best Conventional Pollutant Control Technology (BCT)
- New Source Performance Standards (NSPS)
- Pretreatment Standards for Existing Sources (PSES)
- Pretreatment Standards for New Sources (PSNS)

The pretreatment standards (PSES, PSNS) are applicable to industrial facilities with process wastewater discharges to publicly owned treatment works (POTWs). The effluent limitations guidelines and new source performance standards (BPT, BAT, BCT and NSPS) are applicable to industrial facilities with direct discharges of process wastewaters to waters of the United States.

Electric Arc Furnace (EAF). A furnace in which steel scrap and other ferrous and nonferrous materials are melted using electrical and chemical energy and converted into liquid steel.

Electric-Resistance-Welded Pipe/Tube. Pipe or tube formed from a plate or continuous strip of steel that is formed into a circular shape and welded together using pressure and electrical energy. Heat is generated by the resistance to current flow (either transformed or induced) across the seam during welding.

<u>Electrolytic Descaling</u>. The aggressive physical and chemical removal of heavy scale from semi-finished specialty and high-alloy steels using electrolytic sodium sulfate solutions.

<u>Electroplating</u>. Operations including metal coating onto precleaned steel using an electric current. Common metal coating types include chromium and tin. Electroplating improves resistance to corrosion and, for some products, improves appearance and paintability.

<u>Electroslag Remelting (ESR)</u>. A specialty steel-refining process used to produce ingots with stringent composition requirements. In the process, one or more steel electrodes of about the desired chemical composition are drip-melted through molten slag into a water-cooled copper mold at atmospheric pressure.

<u>Electrostatic Precipitator (ESP)</u>. An air pollution control device that imparts an electrical charge on solid particles in the gas stream, which are then attracted to an oppositely charged collector plate. The collector plates are intermittently rapped to discharge the collected dust to a hopper below.

<u>End-of-Pipe (EOP) Treatment</u>. Refers to those processes that treat a facility waste stream for pollutant removal prior to discharge.

<u>EPA</u>. The U.S. Environmental Protection Agency (also referred to as "the Agency").

<u>Extrusion</u>. A forming operation in which a material is forced, by compression, through a die orifice.

<u>Filtration</u>. The passage of fluid through a porous medium to remove matter held in suspension.

<u>Final Gas Cooler</u>. A packed tower used for cooling coke oven gas by direct contact with water. The gas is generally cooled to approximately 30°C (86°F) for recovery of light oil.

<u>Finishing</u>. Term used to generically describe steel processing operations conducted after hot forming (e.g., acid pickling, scale removal, cold forming, annealing, alkaline cleaning, hot coating, and electroplating).

<u>Flat Products</u>. Hot-rolled steel products including plate, strip, and sheet, that may or may not be further finished (e.g., cold-rolled or acid pickled).

<u>Flume Flushing</u>. Process by which mill scale collected under hot forming mills and runout tables of continuous casters is transported with water to scale pits for subsequent recovery.

<u>Flushing Liquor</u>. See ammonia liquor.

<u>Flux</u>. Material added to a blast furnace or steelmaking furnace for the purpose of removing impurities from the molten metal.

<u>Forging</u>. Hot-working of heated steel shapes (i.e., ingots, blooms, billets, slabs) by hammering or hydraulic presses.

<u>Forming</u>. Operations in which the shape of a metal piece is changed by plastic deformation (e.g., forging, rolling, extrusion, and drawing).

<u>Foundry Coke</u>. Coke produced for foundry operations.

<u>Four-High Mill</u>. A stand which has four rolls, one above the other. This kind of mill has two working rolls, each of which is stiffened by a larger back-roll. Four high rolls are used only on mills which roll flat products.

<u>FR</u>. <u>Federal Register</u>, published by the U.S. Government Printing Office. A publication making available to the public regulations and legal notices issued by federal agencies.

<u>Free Leg</u>. That section of an ammonia still from which ammonia, hydrogen sulfide, carbon dioxide, and hydrogen cyanide are steam distilled and returned to the gas stream without the addition of an alkaline substance to release free ammonia.

<u>Fugitive Emissions</u>. Emissions that are expelled to the atmosphere in an uncontrolled manner.

<u>Fume Scrubbers</u>. See Wet Scrubbers.

<u>Fundamentally Different Factors Variance, CWA Section 301(n)</u>. The Administrator, with the concurrence of the State, may establish an alternative requirement under Section 301(b)(2) or Section 307(b) of the Clean Water Act for a facility that modifies the requirements of national effluent limitation guidelines or categorical pretreatment standards that would otherwise be applicable to such facility, if the owner or operator of such facility demonstrates to the satisfaction of the Administrator that the facility is fundamentally different with respect to the factors (other than cost) specified in Sections 304(b) or 304(g) and considered by the Administrator in establishing such national effluent limitation guidelines or categorical pretreatment standards.

<u>Furnace Burden</u>. The solid materials charged to a blast furnace comprising coke, iron ore and pellets, sinter, and limestone.

<u>Furnace Coke</u>. Coke produced for blast furnace operations.

<u>Galvanizing</u>. Application of zinc to the surface of steel primarily for corrosion protection. Zinc may be applied by passing precleaned steel through a molten zinc bath (hot dip galvanizing) or electrochemically (electrogalvanizing).

<u>Ground Water</u>. Water in a saturated zone or stratum beneath the surface of land or water.

<u>Hardness</u>. Defined in terms of the method of measurement. (1) Usually, the resistance to dentation. (2) Stiffness or temper of wrought products. (3) Machinability characteristics.

<u>Hazardous Waste</u>. Any material that meets the Resource Conservation and Recovery Act definition of "hazardous waste" contained in 40 CFR Part 261.

<u>Hearth</u>. In a reverberatory furnace, the portion that holds the molten metal or bath.

<u>Heat</u>. Quantity of steel manufactured per batch in a BOF or an EAF.

<u>Hexane Extractable Material (HEM)</u>. A method-defined parameter (EPA Method 1664) that measures the presence of relatively nonvolatile hydrocarbons, vegetable oils, animal fats, waxes, soaps, greases, and related material that are extractable in the solvent n-hexane. This parameter does not include materials that volatilize at temperatures below 85ºC. EPA uses the term "HEM" synonymously with the conventional pollutant oil and grease (O&G).

<u>Hot Blast</u>. Preheated air blown into the blast furnace through a bustle pipe and numerous tuyeres located around the circumference of the furnace. Temperatures range from 550°C to 1,000°C, and pressures range from 2 to 45 atmospheres.

<u>Hot Coating (Hot Dip Coating)</u>. Operations in which precleaned steel is immersed into baths of molten metal. Common metal types include: tin, zinc (galvanizing), combinations of lead and tin (terne coating), and combinations of aluminum and zinc (galvalume® coating). Hot coating is typically used to improve resistance to corrosion, and for some products, to improve appearance and paintability.

<u>Hot Forming</u>. Also known as hot working; a forming operation in which the shape of the metal piece is changed by plastic deformation at a temperature above that at which recrystallization occurs. The plastic deformation can be effected by rolling, extrusion, or drawing.

<u>ICR</u>. Information Collection Request.

<u>Incineration</u>. A controlled combustion process most commonly used to destroy solid, liquid, or gaseous wastes.

<u>Indirect Discharger</u>. An industrial discharger that introduces wastewater into a POTW.

<u>Ingot</u>. A large block-shaped steel casting. Ingots are intermediates from which other steel products are made. When continuous casters are not used, an ingot is usually the first solid form the steel takes after it is made in a furnace.

<u>Ingot Mold</u>. Cast iron molds into which molten steel is teemed. After cooling, the mold is stripped from the solidified steel, which is then reheated in soaking pits (gas or oil-fired furnaces) prior to primary rolling into slabs or billets. Molds may be circular, square, or rectangular, with walls of various thickness. Some molds are of larger cross-section at the bottom, whereas others are larger at the top.

Integrated Steel Mill. A mill that makes steel by processing iron ore and other raw materials in blast furnaces and BOFs, rather than EAFs as at non-integrated or mini-mills.

Iron. Primarily the name of a metallic element. In the steel industry, iron is the name of the product of a blast furnace containing 92 to 94 percent iron, the product made by the reduction of iron ore. Iron in the steel mill sense is impure and contains up to 4 percent dissolved carbon along with other impurities.

Iron and Steel Coke Plant. By-product cokemaking operations that provide more than 50 percent of the coke produced to ironmaking blast furnaces associated with steel production.

Iron Ore. The raw material from which iron is made. It is primarily iron oxide with impurities such as silica.

Ironmaking. The production of iron through the reduction of iron ore. In the United States, iron is made in blast furnaces.

Ladle. A large vessel into which molten metal or molten slag is received and handled.

Ladle Metallurgy. A secondary step in the steelmaking process usually performed in a ladle after the initial refining process in a steelmaking furnace (i.e., BOF, EAF) is complete. Ladle metallurgy is conducted for one or more of the following purposes: to control gases in the steel; to remove, add, or adjust concentrations of metallic or nonmetallic compounds (alloying); and to adjust physical properties (e.g., temperature).

Landfill Leachate. Water or ground water collected from that portion of a solid or hazardous waste landfill containing disposed of solid or hazardous wastes.

Larry Car. A movable device located on top of a coke battery for receiving and charging screened coal to coke ovens through charging holes located at the top of the ovens.

Light Oil. An unrefined, clear, yellow-brown oil with an approximate specific gravity of 0.889 produced as a by-product of by-product cokemaking operations. It contains varying amounts of coal-gas products with boiling points ranging from about 40°C to 200°C and from which benzene, toluene, xylene, and solvent naphthas are recovered.

Lime. Calcium oxide (CaO), produced by burning limestone (principally composed of calcium carbonate ($CaCO_3$)) in a lime kiln. Lime is used as a flux (slagging agent) in BOF and EAF steelmaking; limestone is used as a flux in blast furnaces for production of molten iron.

LTA. Long-term average. For purposes of the pretreatment standards, average pollutant levels achieved over a period of time by a facility, subcategory, or technology option.

Merchant Coke Plant. By-product cokemaking operations other than those at iron and steel coke plants.

µg/L. Micrograms/liter.

mg/L. Milligrams/liter.

Mill Scale. The iron oxide scale that breaks off of heated steel as it passes through a rolling mill. The outside of the piece of steel is generally completely coated with scale as a result of being heated in an oxidizing atmosphere.

Mini-Mill. See Non-Integrated Steel Mill.

Minimum Level (ML). The level at which an analytical system gives recognizable signals and an acceptable calibration point.

Mixed-Media Filtration. A filtration technology which uses a bed of granular particles to remove small concentrations of entrained solids from iron and steel wastewaters. The bed is comprised of either particles of varying size or different types of media (e.g., sand, gravel, anthracite). (Also referred to as multimedia filtration.)

Mold. A form or cavity into which molten metal is poured to produce a desired shape. See ingot molds.

Multimedia Filtration. A filtration technology which uses a bed of granular particles to remove small concentrations of entrained solids from iron and steel wastewaters. The bed is comprised of either particles of varying size or different types of media (e.g., sand, gravel, anthracite). (Also referred to as mixed-media filtration.)

Multiple Stand (Multi Stand). A type of cold rolling stand that has greater than one roll, one above the other, used on flat products.

NAICS. The North American Industry Classification System, a system for classifying business establishments adopted in 1997 to replace the old Standard Industrial Classification (SIC) system. NAICS is the industry classification system used by the statistical agencies of the United States.

Naphthas. Any of several inflammable, volatile liquids produced by the distillation of coal, coal tar, wood, petroleum, and other carbonaceous materials.

NESHAPs. The National Emission Standards for Hazardous Air Pollutants (NESHAPs) regulations set out at 40 CFR 61, Subpart J (6/6/89), Subpart L (9/14/89), Subpart BB (3/7/90), and Subpart FF (3/7/90).

<u>Nitrification</u>. The oxidation of ammonium salts to nitrites (via Nitrosomas bacteria) and the further oxidation of nitrite to nitrate via Nitrobacter bacteria. Nitrification can be accomplished in either (1) a single or two-stage activated sludge wastewater treatment system or (2) wetlands specifically developed with a march/pond configuration and maintained for the express purpose of removing ammonia-N. Indicators of nitrification capability are: (1) biological monitoring for ammonia oxidizing bacteria (AOB) and nitrite oxidizing bacteria (NOB) to determine if the nitrification is occurring; and (2) analysis of the nitrogen balance to determine if nitrifying bacteria reduce the amount of ammonia and increase the amount of nitrite and nitrate.

<u>Noncontact Cooling Water</u>. Water used for cooling in-process and non-process applications that does not come into contact with any raw material, intermediate product, by-product, waste product (including air emissions), or finished product.

<u>Nonconventional Pollutants</u>. Pollutants other than those defined specifically as conventional pollutants (identified in section 304(a) of the Clean Water Act) or priority pollutants (identified in 40 CFR Part 423, Appendix A).

<u>Nondetect Value (ND)</u>. Samples below the level that can be reliable measured by an analytical method. This is also known, in statistical terms, as left-censored (i.e., value having an upper bound at the sample-specific detection limit and a lower bound at zero).

<u>Non-Integrated Steel Mill (Mini-Mill)</u>. Steel mills that melt scrap metal in an EAF to produce commodity products.

<u>Non-Process Wastewater</u>. Wastewaters generated by non-process operations such as utility wastewaters (water treatment residuals, boiler blowdown, air pollution control wastewaters from heat recovery equipment, and water generated from co-generation facilities), treated or untreated wastewaters from ground water remediation systems, dewatering water for building foundations, and other wastewater streams not associated with production processes.

<u>Non-Recovery Cokemaking</u>. Production of coke from coal in which volatile components derived from the coal are consumed in the process and by-products are not recovered.

<u>NPDES Program</u>. The National Pollutant Discharge Elimination System (NPDES) program authorized by Sections 307, 318, 402, and 405 of the Clean Water Act that applies to facilities that discharge wastewater directly to U. S. surface waters.

<u>NRDC</u>. Natural Resources Defense Council.

<u>NSPS</u>. New source performance standards, under section 306 of the Clean Water Act. See also Effluent Limitations Guidelines and Standards.

<u>Oil and Grease (O&G)</u>. A method-defined parameter (EPA Method 413.1) that measures the presence of relatively nonvolatile hydrocarbons, vegetable oils, animal fats, (EPA nitrous 413.1) waxes, soaps, greases, and related materials that are extractable in Freon 113 (1,1,2-trichloro-

1,2,2-trifluoroethane). This parameter does not include materials that volatilize at temperatures below 75ºC. Oil and grease is a conventional pollutant as defined in section 304(a)(4) of the Clean Water Act and in 40 CFR Part 401.16. Oil and grease is also measured by the hexane extractable material (HEM) method (see Method 1664, promulgated at 64 FR 26315; May 14, 1999). The analytical method for TPH and oil and grease has been revised to allow for the use of normal hexane in place of Freon 113, a chlorofluorocarbon (CFC). Method 1664 (Hexane Extractable Material) replaces the current oil and grease Method 413.1 found in 40 CFR 136.

Oil Skimmer. A device that skims the top surface of wastewater to remove floating oil.

Open Hearth Furnace. A furnace for melting metal, in which the bath is heated by the convection of hot gases over the surface of the metal and by radiation from the roof.

Oxidization. A chemical treatment that increases the positive valences of a substance. In a limited sense, adding oxygen to a substance, as in oxidizing C to CO, CO to CO_2, Si to SiO_2, Mn to MnO.

Pig Iron. Iron cast into the form of small blocks that weigh about 30 kilograms each. The blocks are called pigs.

Pipe. A hollow, cylindrical product distinguished from tube by heavier wall thickness. Pipe is usually measured by its inside diameter. Tube is generally measured by outside diameter.

Plant Service Water. City, well, or surface water that has not been used elsewhere on site (i.e., water prior to its use in a process or operation).

Plate. A flat-rolled finished steel product within the following size and/or weight limitations:

Width	Thickness
Over 48 inches wide	0.180 inches or thicker
Between 8 and 48 inches inclusive	0.230 inches or thicker
Over 48 inches wide	7.53 lb/sq ft or heavier
Between 8 and 48 inches inclusive	9.62 lb/sq ft or heavier

POC. Pollutant of concern.

Pollutant Loading. The quantity of a pollutant in the wastestream, in pounds per year.

Pollution Prevention. The use of materials, processes, or practices that reduce or eliminate the creation of pollutants or wastes. It includes practices that reduce the use of hazardous and nonhazardous materials, energy, water, or other resources, as well as those practices that protect natural resources through conservation or more efficient use. Pollution prevention consists of source reduction, in-process recycle and reuse, and water conservation practices.

Polychlorinated Biphenyl (PCB) Compounds. Any of a family of halogenated aromatic hydrocarbons that were produced and marketed in the United States as a series of complex mixtures under the trade name Aroclor; any specific chemical included within the following Chemical Abstracts Service Registry Numbers: 1336-36-3 (total PCBs), 12674-11-2 (Aroclor 1016), 11104-28-2 (Aroclor 1221), 11141-16-5 (Aroclor 1232), 53469-21-9 (Aroclor 1242), 12672-29-6 (Aroclor 1254), or 11096-82-5 (Aroclor 1260), see 40 CFR 302; or, any of 209 synthetic congeners of biphenyl with 1 to 10 chlorine substitutions.

Potable Water. Water that can be consumed; drinking water.

Priority Pollutants. The 126 toxic pollutants listed in 40 CFR Part 423, Appendix A.

Privately Owned Treatment Works (PrOTW). Any device or system owned and operated by a private entity and used to store, treat, recycle, or reclaim liquid industrial wastes.

Process Wastewater. Any wastewaters that come into direct contact with the process, product, by-products, or raw materials for the manufacturing of iron and steel. Process wastewaters also include wastewater from slag quenching, equipment cleaning, air pollution control devices, rinse water, and contaminated cooling water. Sanitary wastewater and storm water are not considered process wastewaters. Non-contact cooling wastewaters are cooling waters that do not directly contact the processes, products, by-products, or raw materials; these wastewaters are not considered process wastewaters.

PSES. Pretreatment standards for existing sources of indirect discharges, under section 307(b) of the Clean Water Act. See also Effluent Limitations Guidelines and Standards.

PSNS. Pretreatment standards for new sources of indirect discharges, under sections 307(b) and (c) of the Clean Water Act. See also Effluent Limitations Guidelines and Standards.

Publicly Owned Treatment Works (POTW). Any device or system owned and operated by a public entity and used in the storage, treatment, recycling, or reclamation of liquid municipal sewage and/or liquid industrial wastes. The sewerage system that conveys wastewaters to treatment works is considered part of the POTW.

QA/QC. Quality Assurance/Quality Control.

Quenching. A process of rapid cooling from an elevated temperature by contact with liquids, gases, or solids.

Recirculation. In cold rolling, use and recirculation of water, detergent, rolling oil, or other substance to remove loose organic compounds and fines.

Reduction. A chemical treatment that decreases the positive valences of a substance. In a limited sense, removing oxygen from a substance (e.g., reducing CO to C, CO_2 to CO, SiO_2 to Si, MnO to Mn).

Refining. Oxidation cycle for transforming hot metal (iron) and other metallics into steel by removing elements present, such as silicon, phosphorus, manganese, and carbon.

Reheat Furnace. A gas-fired, refractory-lined furnace used to heat steel shapes for subsequent hot forming operations.

Rod. A hot-rolled steel section, usually round in cross-section, produced as a final product or as an intermediate product for subsequent production of wire and wire products.

Rolling. A forming operation that reduces the thickness of a metal piece by passing it between two or more rolls.

Roughing Stand. The rolls used to break down the ingot, billet, or slab in the preliminary rolling of metal products.

Runout Table. Area of a hot strip mill located after the finishing stands and before the coilers where laminar-flow cooling is applied to the strip. Generally, for any hot forming mill, this area of the mill is downstream of the last stand of work rolls. For continuous casters, this area of the process is after the torch cut-off.

Salt Bath Descaling. The aggressive physical and chemical removal of heavy scale from semi-finished specialty and high-alloy steels with molten salt baths or solutions containing neutral or acidic salts.

Scale. Iron oxides that form on the surface of hot steel when the steel is exposed to an oxidizing atmosphere.

Scale Pit. An in-ground rectangular (and in some instances, circular) basin constructed of concrete to recover scale from process wastewaters used in hot forming and continuous casting operations. Collected scale is mechanically removed and recovered for recycle to a sinter plant or for sale as a by-product.

Scarfing. Removal of imperfections on the surface of semi-finished steel shapes using oxygen/acetylene torches.

Scrap. Iron or steel discard, cuttings, or junk metal, that can be reprocessed.

Seamless Pipe/Tube. Tubular product produced by piercing (a hot forming process), which is followed by further processing to achieve correct wall and size dimensions, or by extrusion for small diameter products.

Secondary Steelmaking. The practice of redistributing steel that does not meet the original customer's specifications because of a defect in its chemistry, gauge, or surface quality. Some steel users may accept lower quality, off-spec steel, usually at a lower price.

<u>Section 301(g) Variance</u>. The Administrator, with the concurrence of the State, may modify the requirements of Section 301(b)(2)(A) of the Clean Water Act with respect to the discharge from any point source of ammonia, chlorine, color, iron, and total phenols (4AAP) (when determined by the Administrator to be a pollutant covered by Section 301(b)(2)(F)) and any other pollutant which the Administrator lists under 301(g)(4). In the iron and steel industry, variances under Section 301(g) have been granted for discharges of ammonia-N and phenols (4AAP) from cokemaking and ironmaking operations. The variances granted under Section 301(g) must meet certain conditions (e.g., the alternative discharges from BAT must meet local water quality standards, cannot be less stringent than BPT, must not result in more stringent controls on other dischargers, and must satisfy other environmental and human health concerns).

<u>Semi-Finished Shapes</u>. Steel in the form of ingots, blooms, billets, or slabs that are forge or rolled into a finished product.

<u>Semi-Wet Air Pollution Control Equipment</u>. A gas cleaning system in which furnace off-gases are conditioned with moisture prior to processing in electrostatic precipitators or baghouses.

<u>Sendzimir Mill</u>. Type of cold rolling mill used to finish hot-rolled strip to a specific width, thickness, and hardness.

<u>Shear</u>. In a steel mill, a machine that cuts steel products. Steel shears may be classified by: type of drive (hydraulic and electric); type of work performed (cropping, squaring, slab, bloom, billet, bar shears); type of mechanism (rotary, rocking, gate, guillotine, alligator shears); and movement of work while shearing (flying shears).

<u>Sheet</u>. Steel produced in coils or in cut lengths within the following size limitations:

Width	Thickness
Between 12 and 48 inches inclusive	0.1800 to 0.2299 inch
Over 12 inches	0.0449 to 0.1799 inch

<u>SIC</u>. Standard Industrial Classification, a numerical categorization scheme used by the U.S. Department of Commerce to denote segments of industry. The SIC system was replaced in 1997 by the NAICS.

<u>Silica Gel Treated Hexane Extractable Material (SGT-HEM)</u>. The freon-free oil and grease method (EPA Method 1664) used to measure the portion of oil and grease that is similar to total petroleum hydrocarbons. (Also referred to as nonpolar material (NPM)).

<u>Single Stand</u>. A type of cold rolling stand which has only one roll, used on flat products.

<u>Sinter</u>. In blast furnace usage, lumpy material that has been prepared from flue dust, other iron-bearing materials, lime, and coke breeze. The dust is agglomerated by heating it to a high temperature. Sinter contains valuable amounts of combined iron.

<u>Sintering</u>. The process of burning a fuel (e.g., coke fines, coke breeze) with limestone fines and a variety of fine iron-bearing materials including iron ore screenings, blast furnace gas cleaning wastewater sludges, and mill scale to form an agglomerated product suitable to charge to a blast furnace. The product is a clinker-like aggregate referred to as sinter or clinker.

<u>Site</u>. Generally one contiguous physical location at which manufacturing operations related to the iron and steel industry occur. This includes, but is not limited to, cokemaking, ironmaking, steelmaking, rolling, and finishing. In some instances, a site may include properties located within separate fence lines, but located close to each other.

<u>Skelp</u>. Flat, hot-rolled steel strip or sheet used to manufacture welded pipe or tube products.

<u>Slab</u>. A semifinished block of steel formed from a rolled ingot or manufactured on a continuous slab casting machine, with its width at least twice its thickness.

<u>Slag</u>. Vitrified mineral by-product produced in the reduction of metals from their ores. The principal components of blast furnace slag are oxides of silica and alumina originating chiefly with the iron-bearing materials and lime and magnesia originating with the flux. The major components of steelmaking slags are calcium silicates, lime-iron compounds, and lesser amounts of free lime and magnesia. Usually, slags consist of combinations of acid oxides with basic oxides; neutral oxides are added to aid fusibility.

<u>Sludge Dewatering</u>. The mechanical or natural processes to remove free water from wastewater sludges. Mechanical equipment used for sludge dewatering may include rotary or leaf vacuum filters, filter presses, or belt filters. Wastewater sludges may be dewatered naturally in sludge drying beds.

<u>Specialty Steel</u>. Steel products containing alloying elements that are added to enhance the properties of the steel product when individual alloying elements (e.g., aluminum, chromium, cobalt, columbium, molybdenum, nickel, titanium, tungsten, vanadium, zirconium) exceed 3 percent or the total of all alloying elements exceeds 5 percent.

<u>Stainless Steel</u>. A trade name given to alloy steel that is corrosion and heat resistant. The chief alloying elements are chromium, nickel, and silicon in various combinations with possible small percentages of titanium, vanadium, and other elements. By American Iron and Steel Institute (AISI) definition, a steel is called "stainless" when it contains 10 percent or more chromium.

<u>Staves</u>. Cast iron or copper elements containing flow channels for cooling water that are installed within the steel jacket of the bosh.

Steel. A hard, tough metal composed of iron alloyed with carbon and other elements to enhance hardness and resistance to rusting.

Strand. A continuous casting mold and its associated mechanical equipment. Also, a term applied to the traveling grate of the sintering machine.

Strip. Steel produced in coils or in cut lengths within the following size limitations:

Width	Thickness
Up to 3-1/2 inches inclusive	0.0255 to 0.2030 inch inclusive
Between 3-1/2 and 6 inches inclusive	0.0344 to 0.2030 inch inclusive
Between 6 and 12 inches inclusive	0.0449 to 0.2299 inch inclusive

Surface Water. Waters of the United States as defined at 40 CFR 122.2.

Tandem Mill. A mill with a number of stands in succession; generally a cold rolling mill.

Tapping. Process of opening a taphole in a blast furnace to remove hot metal and slag; process of pouring molten steel from a steelmaking furnace into a receiving ladle to transfer to a ladle metallurgy station or continuous caster, or into a teeming ladle to pour into ingot molds.

Tar. Black, viscous organic matter removed from coke oven gas in recirculating flushing liquor systems in the gas collector mains located on top of the by-product recovery coke battery. Tar is subsequently recovered in a tar or flushing liquor decanter where most of the tar is separated from recirculating flushing liquor by gravity.

Technical Development Document (TDD). Development Document for the Proposed Effluent Limitations Guidelines and Standards for the Iron and Steel Point Source Category.

Teeming. Pouring or casting of molten steel from a ladle into cast iron ingot molds of various dimensions to cool and solidify the steel.

Temper Mill. Relatively light cold rolling process (< 1 percent thickness reduction) performed to improve flatness, alter the mechanical properties of the steel, and minimize surface disturbances. Temper mills are usually single-stand mills.

Total Organic Carbon (TOC). A nonconventional bulk parameter that measures the total organic content of wastewater (EPA Method 415.1). Unlike five-day biochemical oxygen demand (BOD_5) or chemical oxygen demand (COD), TOC is independent of the oxidation state of the organic matter and does not measure other organically bound elements, such as nitrogen and hydrogen, and inorganics that can contribute to the oxygen demand measured by BOD_5 and COD. TOC methods utilize heat and oxygen, ultraviolet irradiation, chemical oxidants, or combinations of these oxidants to convert organic carbon to carbon dioxide (CO_2). The CO_2 is then measured by various methods.

Total Petroleum Hydrocarbons (TPH). - A method-defined parameter that measures the presence of mineral oils that are extractable in Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane) and not absorbed by silica gel. The analytical method for TPH and oil and grease has been revised to allow the use of normal hexane in place of Freon 113, a chlorofluorocarbon (CFC). Method 1664 (Hexane Extractable Material) replaces the current oil and grease Method 413.1 found in 40 CFR 136. (Also referred to as nonpolar material (NPM).)

Traveling Grate. Part of a sinter machine or other agglomeration process consisting of zones for drying, preheating, combustion, and cooling.

TRC. Total Residual Chlorine.

TSS. Total Suspended Solids.

Tube. A hollow, cylindrical product distinguished from pipe by thinner wall thickness. Tube is usually measured by its outside diameter. Pipe is generally measured by inside diameter.

Tundish. A refractory-lined vessel located between the ladle and the continuous caster. Molten steel is tapped from the ladle to the tundish to provide a stable flow of metal into the caster.

Tuyeres. Water-cooled openings located around the circumference of a blast furnace at the top of the hearth through which the hot blast enters the furnace.

Utility Operations. The ancillary operations at a steel mill necessary for mill operations, but not part of a production process (e.g., steam production in a boiler house, power generation, boiler water treatment, intake water treatment).

Vacuum Degassing. A process to remove dissolved gases from liquid steel by subjecting it to a vacuum.

Vacuum Ladle Degassing. A variation of vacuum degassing that includes induction stirring and vacuum-oxygen decarburization.

Variability Factor (VF). A variability factor is used in calculating a limitation to allow for reasonable, normal variation in pollutant concentrations when processed through well-designed and operated treatment systems. Variability factors account for normal fluctuations in treatment. By accounting for these reasonable excursions about the long-term average, EPA's use of variability factors results in limitations that are generally well above the actual long-term average.

Venturi Scrubber. A wet air pollution control device that operates by causing intermixing of particulates in a gas stream and water applied to the scrubber. The intermixing is accomplished by rapid contraction and expansion of the gas stream and a high degree of turbulence in the throat of the scrubber.

Volatile Organic Compound (VOC). A measure of volatile organic constituents performed by isotope dilution gas chromatography/mass spectrometry (GC/MS), EPA Method 1624. The isotope dilution technique uses stable, isotopically labeled analogs of the compounds of interest as internal standards in the analysis.

Wastewater. See Process Wastewater.

Wastewater Treatment. The processing of wastewater by physical, chemical, biological, or other means to remove specific pollutants from the wastewater stream or to alter the physical or chemical state of specific pollutants in the wastewater stream. Wastewater is treated so it can be discharged, recycled to the same process that generated the wastewater, or reused in another process.

Water Bubble. Section 420.03, Alternative Effluent Limitations Under the "Water Bubble" (commonly known as the "water bubble" rule) provides a regulatory flexibility mechanism to allow trading of identical pollutants at any single steel facility with multiple compliance points. See §420.03 and Section 17.6 for the specific provisions and restrictions of the water bubble.

Wet Air Pollution Control Equipment. Venturi, orifice plate, or other units used to bring water into intimate contact with contaminated gas to remove contaminants from the gas stream.

Wet Precipitator. An air pollution control device that uses a spray water wash to cleanse the fume residue that is collected dry on precipitator plates. Two types of wet precipitators can be used: intermittent (on a timed cycle) or continuous.

Wet Scrubbers. Venturi or orifice plate units used to bring water into contact with the dirty gas stream to remove pollutants.

Wet-Open Combustion Gas Cleaning System. A BOF gas cleaning system in which excess air is admitted to the off-gas collection system, allowing carbon monoxide to combust prior to high-energy wet scrubbing for air pollution control.

Wet-Suppressed Combustion Gas Cleaning System. A BOF gas cleaning system in which a limited amount of excess air is admitted to the off-gas collection system prior to high-energy wet scrubbing for air pollution control, thus minimizing combustion of carbon monoxide and the volume of gas requiring subsequent treatment.

Windbox. Sintering machine device to draw air through the sinter strand to enhance the combustion of fuel in the sinter mix.

Wire. Small-diameter steel section produced by cold drawing rod through one or more dies.

Work Rolls. Nongrooved rolls that come into contact with the piece of steel (slab, plate, strip, sheet) being rolled.

<u>Zero Discharge or Alternative Disposal Methods</u>. Disposal of process and/or non-process wastewaters other than by direct discharge to a surface water or by indirect discharge to a POTW or PrOTW. Examples include incineration, deep well injection, evaporation on slag or coke, and contract hauling.